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#18

FARKAS & MANELLI P.L.L.C.
ATTORNEYS

March 20, 1997

Hand Carry (Group 2600, Crystal Park II, 8th Floor)
Supervisory Examiner Douglas Olms
U.S. Patent and Trademark Office
Washington, D.C. 20231

Re: **U.S. Patent 5,586,121 (Appln. No. 08/426,920)**
Filed: April 21, 1995
Inventor: Eduardo J. Moura, et al.
For: Asymmetric Hybrid Access System and Method

Dear Mr. Olms:

Pursuant to MPEP Sec. 1481 and 37 CFR Sec. 1.324, we submit the attached **Petition and Declaration of Assignee and Applicants for Correction of Inventorship** in the above-identified issued patent.

Also enclosed are newly executed original and supplemental declarations, supporting exhibits A-I, and the required petition fee of $130 under 37 CFR 1.20(b). Please note the new letterhead address for the undersigned counsel of record.

A review of and action on the Petition at your earliest convenience would be greatly appreciated.

Respectfully submitted,

Lawrence Harbin
Reg. No. 27,644

LH:lah

$130.00 -122

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re UNITED STATES PATENT

Eduardo J. Moura and Jan M. Gronski

Patent No.: **5,586,121**
Issued: **December 17, 1996** Group Art Unit: 2603

Appln. No.: 08/426,920
Filed: April 21, 1995 Examiner: Douglas Olms

Title: ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

* * * * *

OK
Olms

Petition and Declaration of Assignee and Applicants For Correction of Inventorship

Pursuant to 35 USC §256 and 37 CFR §1.324, the undersigned applicants and assignee hereby petition the Commissioner of Patents and Trademarks for issuance of a Certificate correcting the inventive entity named in application no. 08/426,920 (the '920 application) that led to United States Patent 5,586,121 (the '121 patent), as well as, the inventive entities relative to the claims contained in all Rule 60 continuation and divisional applications based on the '920 application.

In support of this petition, we declare and affirm as follows:

1. Through error and without any deceptive intent we attest that Frederick Enns, ("Enns"), Robert L. Packer ("Packer") and Robert A. Luxenberg ("Luxenberg") should have been named as joint inventors along with named inventors Eduardo J. Moura ("Moura") and Jan M. Gronski ("Gronski").

2. The inventors inadvertently omitted contributed to the claimed subject matter of the '121 patent at least in the following manner: (i) the acknowledgment suppression feature of application claim 17[1], as amended (claim 8[2] in the '121 patent) was jointly conceived and reduced to practice by Packer, Moura and Gronski (the invention of claim 17 as originally filed was conceived and implemented by Packer), (ii) the power level control feature recited in application claim 19, as amended (claim 9 in the '121 patent) was jointly conceived by Gronski, Luxenberg and Packer, and (iii) the shared/dedicated channel feature implicitly recited in dependent claims 31-35, 42, 45, 49, 54 of the issued '121 Patent[3] (introduced by amendment of July 31, 1996[4]) was jointly conceived by Moura, Gronski, Enns and Luxenberg.

3. The inadvertent omission of Packer (a former employee of assignee) as a joint inventor was discovered on or about January 2, 1997 shortly after issuance of the '121 patent. In particular, Packer notified Moura on December 30, 1996 that he observed claimed subject matter recited in the '121 patent claims directed to acknowledgment suppression and

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[1] Attachment A.

[2] Attachment E.

[3] Attachment E.

[4] Attachment C. See corresponding claims 44-48, 55, 58, 62 and 67 of the issued '121 patent (Attachment E).

that his name was missing from the issued patent. Within days, Moura contacted assignee's patent counsel who, in turn, interviewed the named inventors and Packer as to their respective contributions to the inventions claimed in the '121 patent, as issued, and in the '920 application, as filed.

4. After such investigation, it was determined that Packer indeed contributed to the conception of features relating to acknowledgment suppression that is embodied in application claim 17 (claim 8 of the '121 patent). Furthermore, on January 16, 1997, after an analysis by Gronski of the features initially claimed and introduced by amendment dated July 31, 1996, applicants also realized that Luxenberg contributed to the invention of application claim 19 (as filed) and that Enns contributed to the invention of dependent claims 44-48, 58, 62 and 67 introduced by amendment[5] on July 31, 1996 in the '920 application.

5. The facts and circumstances that led to the error include (i) the complexity and extent of claimed subject matter in the '920 application (as initially filed[6] and later amended[7]) which made it difficult for Gronski and Moura to discern one inventive aspect from many others when they

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[5] Attachment C.

[6] Attachment A.

[7] Attachment C.

executed the original declaration on April 21, 1995 (i.e., the acknowledgment suppression feature conceived by Packer (application claim 17) and the power management feature conceived by Luxenberg (application claim 19) were only two of 25 initial claims covering multiple claimed features[8] and dependent application claims 44-48, 58, 62 and 67 relating to the shared channel feature developed by Enns were among 61 claims pending after amendment when Moura and Gronski executed the Supplemental Declaration on August 1, 1996), (ii) because Moura rather than Gronski handled matters with patent counsel (Fenwick & West) in supplying information to prepare the original inventorship declaration and Packer and Luxenberg had left assignee's employ (Enns' inventive claims had not then been introduced into the application), patent counsel had no direct source of inventorship information from Gronski or his development team, (iii) because Gronski prepared the description and drawings of Packer's and Luxenberg's conceptions for the initial draft patent application (e.g., these omitted inventors had left assignee's employ when the application was initially drafted), Moura mistakenly believed that Gronski made the conceptions, (iv) for reasons indicated above, Moura mistakenly informed patent counsel (Fenwick & West) that he and Gronski were the only inventors and patent

[8] Other distinctive features which are separately claimed in eight divisional applications include (1) overall architecture, (2) login and channel request algorithms (08/588,378), (3) acknowledge suppression (SN 08/697,080), (4) prioritized polling and credit/done protocols (SN 08/703,767), (5) packet suppression (SN 08/697,079), (6) power level control (SN 08/697,246), (7) operability condition monitoring (SN 08/703,892) and (8) quality-based channel switching (SN 08/700,991).

counsel's contacts with Gronski were technical only rather than administrative, i.e., Gronski had no communications with patent counsel regarding the issue of inventorship but left all administrative matters to Moura and patent counsel and (v) to the extent that Gronski had knowledge of the contributions of Packer, Enns and Luxenberg to any of the subject matter of application claims 17 and 19 when he signed the original declaration and dependent claims 44-48, 58, 62 and 67 when he signed Supplement Declaration, he did so under the mistaken belief that he was signing in the representative capacity for all engineering employees involved and that it was his responsibility and obligation to do so since they had signed over all rights to the invention to assignee.

7. A chronology and description of supporting documentation evidencing the inadvertent error without any deceptive intent on the part of the applicants and assignee are described as follows:

(a) On September 6, 1994, patent counsel requested opening of a case docketing the matter based on a disclosure received from Hybrid on July 14, 1994. (Attachment F) The case docket sheet listed only Moura as the inventor.

(b) On September 16, 1994, Robert L. Packer left the employ of assignee.

(c) On October 20, 1994, Robert Luxenberg left the employ of assignee.

(d) On December 9, 1994, Moura submitted via facsimile descriptive information to patent counsel which included, among other things, the acknowledgment suppression feature of Packer, the automatic gain (power control) feature of Luxenberg and the shared channel feature of Enns. (Attachment G) Prior to this time, Moura and Gronski were busy preparing a written description of the invention for use by patent counsel for completing the patent application. The description of the acknowledgment suppression, power control and shared/dedicated channel features contained in the draft was initially prepared by Gronski but incorporated in the draft patent application of Exhibit G prepared by Moura.

(e) On January 23, 1995, Moura submitted additional disclosure material to patent counsel. (Attachment H)

(f) On February 1, 1995, Rick Fuller, assignee's Vice President of Finance, submitted flow diagrams to patent counsel indicating preparation of acknowledgment suppression and packet suppression diagrams by Moura and Gronski. (Attachment I). It is seen that the algorithms for acknowledgment and packet suppression are closely related.

(g) At least from February 1, 1995 to April 19, 1995, patent counsel diligently worked with Moura and Gronski to prepare the application for filing. In a teleconference on April 19, 1995, Moura informed patent counsel that he and Gronski were inventors and supplied

address information for preparing the inventorship oath. Patent counsel then prepared application papers including the oath.

(h) On April 21, 1995, Moura and Gronski visited patent counsel's office in Palo Alto, California to review the application and to execute the inventorship oath.[9] The meeting with counsel was brief. After execution, the application was filed via express mail on April 21, 1995.

(i) After extensive prosecution, the claims were allowed on September 5, 1996. Original application claims 17 and 19 (patent claims 8 and 9) were amended by an Amendment dated July 31, 1996 to recite the environment of use (e.g., in an interactive asymmetric network conceived by Moura and Gronski) of the acknowledgment suppression feature to which Packer contributed and the power control feature to which Luxenberg contributed. Enns' dependent claims 44-48, 58, 62 and 67 were added via amendment of July 31, 1996.[10] This amendment was sent to Moura for review and handling to obtain Gronski's execution. On August 1, 1996, after review of the July 31, 1996 Amendment, Moura and Gronski executed a Supplemental Declaration[11] that referenced application claims 17 and 19, as well as, new claims 44-48, 58, 62 and 67. For reasons stated in paragraph 5 above, as well as, for reason that applicants believed the

9 Attachment B.
10 Attachment C.
11 Attachment D.

inventorship issue was resolved and made no further thought or inquiry regarding the same, Gronski and Moura again made the same honest mistake relative to the inventive entity for independent claims 17 and 19, and dependent claims 44-48, 58, 62 and 67 when executing the Supplemental Declaration of August 31, 1996.

(j) On December 17, 1996, the '920 application issued to the '121 patent.

(k) On December 30, 1996, Packer, who at that the time was no longer an employee of assignee, notified Moura of a mistake in the name of the inventive entity.

(l) On January 2, 1997, Moura notified patent counsel of the apparent mistake in naming the inventive entity.

(m) Between January 2, 1997 and the present, patent counsel investigated the question of mistaken inventive entity including conducting conferences in person, by telephone and via e-mail with parties to this petition, and thereafter prepared this petition.

7. Assignee, Hybrid Network, Inc., through its undersigned Vice President, consents to the requested correction of the inventive entity.

8. The errors in naming the inventive entity occurred without any deceptive intent on the part of the applicants and assignee.

9. A new corrected inventorship declaration accompanies this petition naming all five inventors.

10. Applicants request that the inventive entity of the issued '121 patent be corrected to reflect **Eduardo J. Moura, Jan M. Gronski, Robert L. Packer, Frederick Enns and Robert A. Luxenberg**, and that applicants be permitted to correct the inventive entity of all continuation and division applications based on the respective contributions of the respective inventors contributing to the claimed subject matter of the respective applications.

All statements made herein on the basis of our own knowledge are true and correct, and all statements made on information and belief are believed to be true and correct. We understand that willful false statements are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and may jeopardize the validity of the referenced patent.

2/11/97
Date

Eduardo J. Moura

2/26/97
Date

Jan M. Gronski

FEB 10, 1997
Date

Hybrid Networks, Inc.
By: Robert Zimmerman, Vice President

EXHIBIT A

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

December 23, 1996

THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE RECORDS OF THIS OFFICE OF THE FILE WRAPPER AND CONTENTS OF:

APPLICATION NUMBER: ***08/426,920***
FILING DATE: ***April 21, 1995***
PATENT NUMBER: ***5,586,121***
ISSUE DATE: ***December 17, 1996***
TITLE OF INVENTION:
ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD
INVENTOR(S):
MOURA, EDUARDO J.; GRONSKI, JAN M.

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

P. R. GRANT
Certifying Officer

H00001

5586121

UTILITY SERIAL NUMBER	PATENT DATE	PATENT NUMBER
08/426,920	DEC 17 1996	5586121

SERIAL NUMBER	FILING DATE	CLASS	SUBCLASS	GROUP ART UNIT	EXAMINER
08/426,920	04/21/95	370		2603	

APPLICANTS

EDUARDO J. MOURA, SAN JOE, CA; JAN M. GRONSKI, PALO ALTO, CA.

NONE

CONTINUING DATA********
VERIFIED

SH

NONE

FOREIGN/PCT APPLICATIONS********
VERIFIED

SH

FOREIGN FILING LICENSE GRANTED 07/29/95 ***** SMALL ENTITY *****

Foreign priority claimed 35 USC 119 conditions met Verified and Acknowledged	AS FILED	STATE OR COUNTRY	SHEETS DRWGS.	TOTAL CLAIMS	INDEP. CLAIMS	FILING FEE RECEIVED	ATTORNEY'S DOCKET NO.
☐ yes ☒ no ☐ yes ☒ no SH Examiner's initials	→	CA	20	25	12	$762.00	1572

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TITLE

ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

U.S. DEPT. OF COMM./ PAT. & TM—PTO-436L (Rev.12-94)

9-18-96

PARTS OF APPLICATION FILED SEPARATELY #11 7 sheets of drawings filed Separately

M. Little
Applications Examiner

NOTICE OF ALLOWANCE MAILED	Assistant Examiner	CLAIMS ALLOWED	
09.05.96	Shick Hom	Total Claims: 61	Print Claim: 1

ISSUE FEE		DRAWING		
Amount Due	Date Paid	Sheets Drwg.	Figs. Drwg.	Print Fig.
$625.00	1104	20	31	4

Douglas W. Olms
DOUGLAS W. OLMS
SUPERVISORY PATENT EXAMINER
ART UNIT 263
Primary Examiner

ISSUE BATCH NUMBER: Z99

PREPARED FOR ISSUE

Label Area

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Form PTO-436A (Rev. 8/92)

H00002

(FACE)

PATENT APPLICATION SERIAL NO. 08/426920

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

SE18066 06/12/95 08426920 19-2555 180 201 31.00CR
140 CS 05/02/95 08426920 1 201 793.00 CK 1572 DK Refund 31.00 DK

PTO-1556
(5/87)

426,920

Abstract of the Disclosure

An asymmetric network communication system for use in a client-server environment having independent forward and return channels operating at different speeds and/or under different protocols on the same or different communication media to provide efficient utilization of shared resources. A network manager, such as a hybrid access system, effects transmission of packetized data on a forward (downstream) channel from the host server to multiple client devices coupled with a shared downstream media at 10 or more megabits per second while simultaneously providing selectable multiple lower speeds of operation on shared or dedicated return (upstream) channels from the client devices to the host server depending on bandwidth availability, bandwidth demand, service level authorization, etc. for the return channel. Forward and return channels may be located on the same or different communication medium including a CATV network, direct broadcast satellite network, television or radio RF broadcast network, wireless or mobile cellular facilities or the like. The return channel may reside on a PSTN either directly coupled with the host server or connected with the network manager for subsequent transmission to the host server. The network manager handles or controls the forward and return communication to establish interactive full-duplex real-time network sessions between the host and a selected client device.

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ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

Field of Invention

This invention relates to systems and methods for extending a high-speed network to remote locations using an asymmetric hybrid access system.

Background of the Invention

Current data communication systems typically use symmetric communication paths between transmit and receive sites, which have substantially the same data rates and use the same media in both directions. Such media may include coaxial, fiber optic, or telephone twisted-pair lines. Some networks alternatively use broadcast only paths. However, no current network combines the flexibility of full-duplex symmetric networks with the cost effectiveness of broadcast only networks.

Prior attempts at achieving asymmetric data communications included modems with very low speed return channels or systems combining a low speed broadcast channel with telephone return lines. However, no prior systems were able to extend a symmetric high-speed backbone network to remote locations at high speeds using an asymmetric hybrid access system. Known prior asymmetric systems are limited to low speed links.

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It is desirable to develop a network which combines the flexibility of a full-duplex network with the effectiveness of a broadcast network at a reasonable cost.

Summary of the Invention

According to the present invention, a high speed backbone network is extended for communications with remote locations with a hybrid asymmetric architecture having fully interactive duplex characteristics and including independent upstream and downstream communication paths operable at separately selectable speeds and protocols. According to one embodiment of the present invention, the hybrid asymmetric architecture includes 6 Megahertz television channels downstream and telephone lines for upstream communications. Alternative downstream communications can be accomplished according to the invention with a selected high bandwidth broadband service, including for example high definition television (HDTV). Downstream communications according to another embodiment can be implemented with a selected low cost, high speed broadband modem. Downstream communications can provide access to data from information sources including companies, government agencies, universities, libraries, and the like. Alternative upstream communications can be accomplished by a narrow band cable TV return channel, ISDN, radio, or a selected low-cost, low to medium speed telephone modem. The asymmetric hybrid system according to the present invention includes an interface with the backbone network connected to selected information sources. The interface includes point of presence (POP) circuits implementing high speed downstream

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communications with lower speed upstream communications. The interface connects the backbone network with cable TV head ends, TV transmitters, cell sites, remote users, and upstream and downstream channels.

The present invention further includes a hybrid access configuration which uses both downstream and upstream channels. The present invention further includes a hybrid access configuration which uses downstream wireless TV channels and upstream public switch telephone network (PSTN), wireless RF communications or integrated services digital network (ISDN) telephone lines. The present invention further includes a hybrid access configuration which uses both downstream and upstream cable TV channels. The present invention further includes a hybrid access configuration which has downstream satellite TV channels and upstream public switch telephone network (PSTN), wireless RF communications, or integrated services digital network (ISDN) telephone lines.

The present invention further includes packet and acknowledge suppression methods to eliminate redundant packet, byte, and acknowledge transmissions in a hybrid access system. A packet is defined as an information unit containing one or more bytes of information. Particularly according to the method of the present invention, a certain amount or number of data packets or bytes are enqueued or transmitted in a transmit-ahead window. Transmission of a window of bytes or packets is followed by a predetermined time-out period while the transmit queue awaits acknowledgments of packets received. To the extent receipt acknowledgments are received as to particular bytes or packets, these packets and bytes in the transmit queue will be deleted from the transmit queue, and the transmit queue is open to receipt of further packets or bytes for

emplacement in slots of the transmission queue for the deletions made. With respect to acknowledgments placed in a transmission queue, indications acknowledging receipt of later bytes and packets supersede acknowledgments of earlier transmitted bytes or packets. Accordingly, under the present invention, the earlier acknowledgments are deleted from an acknowledge transmission queue.

The present invention further includes an automatic address allocation and configuration method in transmissions employing a hybrid access system. According to the present invention, remote users are identified initially with an abstract name, e.g., "Bob," and this abstract name is registered by the network management system. Configuration is established by the downstream routers polling the remote users and registering the location of the remote user responding to the poll made with the particular abstract name. Internet Protocol address and upstream channel allocation is accordingly accomplished subject to the configuration made including abstract name and identified location.

The present invention further includes a prioritized polling method in transmissions employing a hybrid access system. According to a method of the present invention, hybrid upstream routers poll client devices such as remote link adapters (i.e., "RLAs") according to predetermined priority levels. According to one embodiment of the present invention, priority levels are established for state categories of RLAs. According to one embodiment of the present invention, priority level states include status states such as idle, non-responsive, requesting channel(s), active, or active-credit. According to one embodiment of the present invention, RLAs which request a channel are prioritized according to the amount of time its channel requests have gone

unfulfilled. According to one embodiment of the present invention hybrid upstream routers poll downstream RLAs which are idle more frequently than non-responsive RLAs.

The present invention further includes an automatic gain adjustment technique in transmissions employing a hybrid access system, according to which a remote link adapter sends successive indications to a hybrid upstream router at selected different power levels. When a power level indication is received by a hybrid upstream router, the receiving hybrid upstream router confirms receipt of such indication to the sending remote link adapter which then registers an associated power level as qualified. According to one embodiment of the present invention, the selected different power levels are dynamically adjusted in magnitude of transmission level.

The present invention further includes a quality-based upstream channel allocation technique in transmissions employing a hybrid access system. According to the technique, the hybrid upstream router first determines the availability of upstream cable channels by a frequency agile RLA setting a wide range of narrowband upstream channels. The upstream router then makes a quality assessment of available channels in view of most recent demand, and it finally selects an upstream channel in view of the quality assessment made. Quality assessment includes determination of busy status and signal characteristics including error rates, noise floor, and signal to noise ratio. Upstream channels are releasable according to inactivity or time-out criteria, according to which release or reassignment occurs responsive to inactivity for over a threshold period. Inactivity is assessed by the hybrid upstream router monitoring operability indications and data packets received from assigned RLAs.

The present invention further includes a credit allocation technique in transmissions employing a hybrid access system. According to a method of the present invention, an upstream channel is shared by a plurality of RLAs in accordance with a credit criterion, and credit control packets are dispatched to a RLA which permit the RLA to send data packets to arbitrary hosts. Upon sending a data packet, the RLA returns the credit control packet to a server containing software including Hybridware™ code which manages data flows. The Hybridware™ code or Hybridware™ server, according to one embodiment of the present invention, includes software distributed among data processors in the upstream and downstream routers and elsewhere in the HASPOP, including for example in the network management system.

Description of the Drawings

Figure 1 is a detailed schematic drawing of a hybrid access system connected to a backbone network such as the Internet, and having points of presence connecting the backbone network to cable TV headends, TV transmitters, or Logical Nodes (e.g., cell sites), with remote users connecting to an RLA which in turn connects to downstream TV channels and independent lower speed upstream channels;

Figure 2a is a schematic drawing of a hybrid access system point of presence (POP) according to the present invention including at least a single host computer or server and at least a single router including a hybrid downstream router, a hybrid upstream router, a dial-up router, an Internet router, or a backbone network router, and a POP LAN switch;

Figure 2b is a block diagram of a downstream router according to the present invention;

Figure 2c is a block diagram of an upstream router according to the present invention;

Figures 3a, 3b, and 3c comprise a pictorial diagram of a hybrid access system according to the present invention according to which a remote user can communicate with an information provider through the hybrid access system;

Figure 4 is a logical data flow diagram showing data flows between a server and a client computer of the hybrid access system according to the present invention;

Figure 5 is a flow chart of operation of a two-way cable network embodiment of the hybrid access system according to the present invention;

Figure 6 is a flow chart of operation of a one-way cable network embodiment of the hybrid access system according to the present invention, including provision for upstream telephone system data flow;

Figure 7 is a Hybridware™ server state diagram of the upstream channel allocation method according to the present invention;

Figure 8 is a Hybridware™ client state diagram of the upstream channel allocation method according to the present invention;

Figure 9 is a logical data flow diagram showing data flows between router server and client computers of the hybrid access system for automatic

handling of multiple clients according to automatic address allocation methods of the present invention;

Figure 10 is a flow chart of address allocation control protocol according to the present invention;

Figure 11 is a state diagram of the hybrid adaptive gain control protocol according to the present invention;

Figure 12a is a transmission diagram of information exchange between two nodes in an asymmetric network according to the present invention, having a high downstream data rate of n bits per second and a lower upstream data rate of m bits per second;

Figure 12b is a diagram of conventional downstream messaging of first through fourth data packets, 100, 250, 325, and 450, between first and second nodes, in parallel with upstream transmission of receipt acknowledge indications;

Figure 12c is a diagram of a conventional transmission buffer queue in a RLA of a remote client station;

Figure 12d is a diagram indicating a redundant acknowledgment packet in a conventional transmission buffer queue in a RLA of a remote client station;

Figure 12e is a diagram of a conventional transmission buffer queue, indicating no need for an earlier acknowledgment (ack 100) packet in view of a new acknowledgment (ack 210) packet that supersedes the earlier acknowledgment packet;

Figure 12f is a diagram of first through ~~third~~ fourth network nodes serially connected to each other in accordance with the present invention, wherein the link between the ~~first and~~ second and third nodes is asymmetric and that between the ~~second and third nodes is~~ symmetric;

Figure 13 is a tabular description of transmission control protocol/ Internet protocol (TCP/IP) data transmission packet protocol header as used in connection with the present invention;

Figure 14a is a diagram of a sequential data transmission between first and second network nodes, according to the present invention;

Figure 14b is a diagram of the contents of a conventional transmission queue in the downstream node during a first time period;

Figure 14c shows the contents of a transmission queue in a downstream node during a later time period, eliminating retransmission of the 300 packet, according to the present invention, because another 300 packet was already in the transmission queue;

Figure 15 is a flow diagram of the acknowledge suppression method according to the present invention;

Figure 16 is a flow diagram of the packet suppression method according to the present invention;

Figure 17 is a flow diagram of information exchanges between Hybridware™ server and client, under conditions in which the client has no information to transmit;

Figure 18 is a flow diagram of information exchanges between Hybridware™ server and client, under conditions in which the client has information to transmit and the server gradually allocates bandwidth to the client;

Figure 19 is a flow diagram of information exchanges between Hybridware™ server and client, under conditions in which the server allocates the client a dedicated channel, the client transmits data and periodically reports to the server with done messages; and

Figure 20 is a flow diagram of information exchanges between Hybridware™ server and client, under conditions in which a dedicated channel is converted into a shared channel.

Description of the Preferred Embodiment

Figure 1 is a detailed schematic drawing of a hybrid access system 1 according to the present invention, showing a RLA and user workstation 29 connected through hybrid access system 1 to a variety of entities connected to a backbone network 20 such as Internet, including information providers 21, corporations 22, government agencies 23, universities 24, and others 25. A backbone network is one which is typically not directly connected to a user. Hybrid access system 1 according to an embodiment of the present invention includes hybrid access system (HAS) points of presence (POPs) 26 and other points of presence 27. HASPOPs 26 include individual HASPOPs 26 (1)-26(3) which enable communication over a broadband network, either by upstream and downstream cable communications or by downstream cable

and upstream telephone communications or various other hybrid configurations (e.g., wireless or satellite). The present invention particularly includes (1) a hybrid access configuration which uses downstream cable TV channels and upstream public switch telephone network (PSTN), wireless RF communications or integrated services digital network (ISDN) telephone lines; (2) a hybrid access configuration which uses downstream wireless TV channels and upstream public switch telephone network (PSTN), wireless RF communications or integrated services digital network (ISDN) telephone lines; (3) a hybrid access configuration which uses both downstream and upstream cable TV channels; (4) a hybrid access configuration which uses both downstream and upstream wireless channels; and (5) a hybrid access configuration with downstream satellite channels and upstream PSTN, wireless RF communications or ISDN telephone channels.

Backbone network 20 such as the Internet which includes a plurality of Internet servers 20' connected to HASPOPs 26 each including a plurality of host computers and/or servers, collectively referred to as hybrid servers. Hybrid access system 1 further includes broadcast units such as, a cable television (TV) head end 28, independent upstream channels 28; and a RLA 29. U.S. Patent No. 5,347,304 (1994) assigned to Hybrid Networks, Inc., and describing an example of an RLA is hereby expressly referenced and incorporated herein in its entirety. An RLA may receive analog broadcast signals including encoded digital information which the RLA decodes and provides to a data terminal or computer. According to an embodiment of the present invention, the downstream flow of information proceeds from HASPOPs 26(1)-26(3) through cable TV head end or TV transmitters 28 or cell sites 30 and through RLA and user workstation 29. Upstream

information flow proceeds in one case from RLA and user workstation 29 through independent upstream channels 28; to HASPOP 26(1), and then to backbone network 20; along T1 or T3 or other digital lines. In another case, upstream information proceeds from user workstation through RLA 29 through the cable TV network, and cable TV head end 28 to hybrid access system point of presence and then through T1, T3, or other digital lines to backbone network 20. The outputs of the cable TV headends or TV transmitters 28 include pluralities of high speed downstream broadband radio frequency, i.e., RF, channels connected to respective remote users 29. Hybrid access system 1 further includes a plurality of cell sites 30 connected through high speed links to a corresponding hybrid access system point of presence 26. The outputs of cell sites 30 include pluralities of high speed downstream broadband channels connected to selected remote users 29. A particular remote user 29 can be connected via an independent lower speed upstream channel to a hybrid access system point of presence 26 as discussed below or via a similar independent lower speed upstream channel to another point of presence system 27. By lower speed it is meant at a speed reduced from the speed of the high speed link used to transmit information downstream. A particular hybrid access system point of presence 26 can be connected via duplex high speed links to a plurality of cable TV headends or TV transmitters, to a plurality of cell sites 30, or a combination of cable TV headends or TV transmitters 28 and cell sites 30.

Figure 2a is a schematic drawing of a point of presence (POP) system 26(1) according to the present invention, including host computers or servers 39 and a POP local area network, i.e., LAN switch 33 to which host computers or servers 39 are connected. Further connected to LAN switch 33

are one or more downstream and one or more upstream hybrid access system point of presence routers, respectively 34 and 35, one or more dial-up routers 36, a network management system 37, and conventional routers 38. Connected to POP LAN switch 33 are one or more data storage elements or systems. Each downstream hybrid access system point of presence router 34 is connected with a high speed link to a TV transmitter or cable TV headend, for example. Further, each upstream hybrid access system point of presence router 35 is connected to a plurality of independent upstream channels, which operate at a lower speed than the downstream high speed links to TV transmitters or cable TV headends. Each dial-up router 36 is connected to a plurality of independent upstream channels operating at a lower speed than the indicated downstream high speed links. Each conventional router 38 is connected along a high speed line to wide area network (WAN) lines to selected information providers, Internet, or other nodes or businesses. POP LAN switch 33, according to one embodiment of the present invention is connected directly along a high speed line to wide area network (WAN) lines to selected information providers, Internet, or other nodes or businesses.

Figure 2b is a block diagram of hybrid downstream router 34 according to the present invention. In particular, downstream router 34 includes network interface 34a, link interface 34b, physical interface 34c, controller 34d, physical interface 34e, link interface 34f, and network interface 34g. Downstream router 34 and physical interface 34e are connected to POP LAN switch 33 for sending and receiving information, and physical interface 34e, link interface 34f, and network interface 34g are serially connected to each other and to controller 34d for bidirectional communication of selected information. Additionally, controller 34d is connected directly to each of

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physical interface 34e and link interface 34f along indicated lines to accomplish control and messaging functions. Downstream router 34 and physical interface 34c are connected to cable TV headends, TV broadcast sites, cell cites or the like, to communicate information primarily or exclusively in a unidirectional or downstream direction, and physical interface 34c, link interface 34b, and network interface 34a are serially connected to each other and to controller 34d for selected communication of selected information. Additionally, controller 34d is connected directly to each of physical interface 34c and link interface 34b along indicated lines to accomplish control and messaging functions. Downstream router 34 may include one or more of physical interfaces 34c. According to an embodiment of the present invention, router 34 may be a bridge without network interfaces 34a and 34g or a connection without network interfaces 34a and 34g and without link interfaces 34b and 34f. According to yet another embodiment of the present invention, router 34 can be a gateway.

Figure 2c is a block diagram of upstream router 35 according to the present invention. In particular, upstream router 35 includes network interface 35a, link interface 35b, physical interface 35c, controller 35d, physical interface 35e, link interface 35f, and network interface 35g. Upstream router 35 and physical interface 35e are connected to POP LAN switch 33 for sending and receiving information, and physical interface 35e, link interface 35f, and network interface 35g are serially connected to each other and to controller 35d for bidirectional communication of selected information. Additionally, controller 35d is connected directly to each of physical interface 35e and link interface 35f along indicated lines to accomplish control and messaging functions. Upstream router 35 and

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physical interface 35c are connected to upstream channels, e.g., telephone links for example, to communicate information primarily or exclusively in a unidirectional or upstream direction, and physical interface 35c, link interface 35b, and network interface 35a are serially connected to each other and to controller 35d for selected communication of selected information. Additionally, controller 35d is connected directly to each of physical interface 35c and link interface 35b along indicated lines to accomplish control and messaging functions. Upstream router 35 may include one or more of physical interfaces 35c. According to an embodiment of the present invention, router 35 may be a bridge without network interfaces 35a and 35g or a connection without network interfaces 35a and 35g and without link interfaces 35b and 35f. According to yet another embodiment of the present invention, router 35 can be a gateway.

Figures 3a-3b are drawings of a hybrid access system 1 according to the present invention according to which a remote user having a workstation 2 or is connected to LAN 61, as shown respectively in Figures 3b and 3c, can communicate with a selected information provider 21 including LAN 50, bridge or router 51 connected to LAN 50, and dial-up router 52 connected to LAN 50 through a hybrid access system point of presence 26. Further, the HAS POP is connected along a high speed link to bridge or router 51. Additionally, HAS POP 26 is linked to other information providers to receive selected information items. Additionally, dial-up router 52 is connected to a plurality of upstream channels. Figures 3b and 3c additionally show respective first and second users, in one case including workstation 2 in turn including a RLA 60 and in the other instance including RLA 60 and a local area network (LAN) 61 connected to RLA 60. First user 29(1) is connected

to an upstream channel from user workstation 2, and second user 29(2) is connected to an upstream channel directly from RLA 60. In the case of each user, RLA 60 receives input information, particularly radio frequency (RF) information along one of respective input channels connected thereto.

Figure 4 is a logical data flow diagram showing data flows between a server and a client computer of the hybrid access system 1 according to the present invention. Hybrid access system 1 includes a server application 70, a hybrid system manager 71, and a Hybridware™ server 72 connected to LAN 38. Hybrid access system 1 further includes a Hybridware™ client 73 and a client application 74 operating with Hybridware™ client 73. Hybridware™ client 73 communicates with Hybridware™ server 72, as transmitter along upstream channel 75 or as receiver along downstream channel 76. Downstream data traffic is expected to be higher capacity than upstream data traffic: Hence, the bolder depiction of downstream channel 76 than upstream channel 75.

Figure 5 is a flow chart of operation of a two-way cable network embodiment of hybrid access system 1 according to a hybrid protocol embodiment of the present invention. In particular, according to one embodiment of the hybrid protocol of the present invention, client application 74 sends 100 data to server application 70 in an upstream direction, thereby issuing a connection request. Hybridware™ client 73 buffers the data received and checks if it controls an upstream data channel. If it does, then the data is transmitted forthwith. If it doesn't, Hybridware™ client 73 queues up the data message and creates 101 a channel request for a particular subchannel within upstream channel 75. Hybridware™ client 73 then waits 102 for a poll from Hybridware™ server 72, i.e., Hybridware™

router. According to an embodiment of the present invention, prioritized polling is conducted whereby not all clients are polled at the same frequency. Clients in an idle state are polled relatively frequently. Clients in blocked and NON-RESP states are polled but not at the same relatively high frequency. Clients in an ACTIVE state are not polled at all. This is based on the assumption that an active client has what it wants and that it is most important to respond quickly to new connections coming from clients in an IDLE state. Those clients coming from a NON_RESP cycle receive second order attention and can wait a little longer, since they may have already been in a state where communication are impossible and may have been in that state for a considerable period of time. According to one embodiment of the present invention, a poll cycle is the smallest period such that all but active clients are polled at least once. Idle clients may be polled multiple times during one poll cycle. Blocked and non_resp clients are distributed evenly across the poll cycle to assure that the latency for acquiring a channel for idle units is uniform. All clients are grouped according to their state and polled within each group according to the round robin approach according which each of a series is polled in sequence and then the same sequence is repeatedly polled individual by individual. Upon receipt of a poll, Hybridware™ client 73 sends 103 a channel request via lower speed upstream channel 75. Hybridware™ router 72, i.e., server, receives 104 the channel request from Hybridware™ client 73 and initially sends 105 a login message to Hybridware™ system manager 71. Hybridware™ system manager 71 verifies 106 that Hybridware™ client 73 is an authorized user of data processing services on the particular node or system within which hybrid access system 1 operates. Then, Hybridware™ router 72 receives 107 a login response message from Hybridware™ system manager 71 through

LAN 38, which indicates whether the client is allowed to operate on the particular network and which contains other operating characteristics of Hybridware™ client 73. Hybridware™ router 72 then allocates 108 (see state diagrams of Figures 7 and 8) an upstream channel 75 for Hybridware™ client 73, depending on channel availability and suitability. Suitability depends on factors including but not limited to channel quality, type of service required, operating characteristics of Hybridware™ client 73, configuration restrictions, and the like. Hybridware™ router 72 sends 109 an upstream channel allocation message to Hybridware™ client 73 via high speed downstream channel 76, which may according to one embodiment of the present invention specify the frequency on which Hybridware™ client 73 is permitted to transmit. Thereafter, Hybridware™ client 73 receives 110 an upstream channel allocation. Next, Hybridware™ client 73 tunes 111 to the specifically allocated upstream data channel frequency on which it is permitted to transmit data. Finally, Hybridware™ client 73 sends 112 the selected application data from client application 74. Accordingly, client application 74 and server application 70 are able to send and receive 113 data via upstream bandwidth management of an asymmetric hybrid access system, according to the present invention.

Figure 6 is a flow chart of operation of a one-way cable network embodiment of the hybrid access system 1 according to the present invention, including provision for upstream telephone system data flow. According to this embodiment of the present invention, when client application 74 needs to communicate with server application 70 in an upstream direction, Hybridware™ client 73 dials 202 Hybridware™ router 72. Then, Hybridware™ client 73 sends 203 a channel request via lower speed PSTN

upstream channel (not shown). Hybridware™ router 72 receives 204 the channel request and sends 205 a login message to Hybridware™ system manager 71. Hybridware™ system manager 71 verifies 206 Hybridware™ client 73 as an authorized user. Then, Hybridware™ router 72 receives 207 a login response from Hybridware™ system manager 71. Hybridware™ router 72 sends 208 an authorization message to Hybridware™ client 73 via high speed downstream channel 76. Hybridware™ client 73 receives 209 the authorization message for use of a selected upstream PSTN channel. Finally, Hybridware™ client 73 sends 212 the selected application data. Accordingly, client application 74 and server application 70 are able to send and receive 213 selected data via the asymmetric hybrid access system 1.

Figure 7 is a Hybridware™ server state diagram for upstream channel allocation of the hybrid access system according to one embodiment of the present invention. According to the state diagram of Figure 7, the Hybridware™ server can be in one of four states: IDLE 301, NON_RESP 304, BLOCKED 302, or ACTIVE 303. In the IDLE state, the Hybridware™ server expects an IDLE poll response. If there is no request to the client from the application or a channel request message, or if there is no application data that needs to be sent in the upstream direction, the state is idle. Upon receiving a channel request message from a client, the server transitions the client to a BLOCKED state. In a BLOCKED state, the server sends one of two messages to the client, a channel allocation message or a no channel available message. Upon sending a channel allocation message, the server transitions the client to an ACTIVE state. Upon sending a no channel available message, the client remains in a BLOCKED state. The client will remain in the BLOCKED state until either a channel becomes available in which case the server will transition the client

to the ACTIVE state or the server receives a channel release message in which case the server will transition the client to the IDLE state. In the ACTIVE state, the server does not poll the client. The server transitions the client from ACTIVE to IDLE upon receiving a channel deallocation message or upon detecting a system defined inactivity time-out. In the ACTIVE state, the server waits for a periodic heartbeat message from the client. The Hybridware™ server software awaits periodic heartbeat messages from the client at selected time intervals. The server software monitors other channel quality parameters including errors and signal to noise ratios. If the server stops hearing a certain number of operability indications or signals within a system defined interval as to a particular client, or if particular parameters (e.g., signal to noise ratio), then the server send a directed poll to the particular client. Essentially, the client is instructed to respond on another control frequency. If the client responds on the designated control frequency, the server reassigns the upstream channel to the client, so that it can continue to operate. If not, the client is deemed NON_RESP. Channel quality monitoring and channel reassignments are done transparently to the user and the applications. If a certain, system defined, consecutive count of heartbeat messages is missed, the server issues a special poll message or directed poll. If the client does not respond, the server transitions to the NON_RESP state. If the client responds to the poll, the server either remains in the ACTIVE state or transitions to the IDLE state. The former happens, if the client responds with a channel request message, and the latter happens, if the client responds with an IDLE poll response. In the former case, the server may decide to assign a different upstream channel to the client. In the BLOCKED or IDLE state, the server will transition the client to NON_RESP, i.e., "non-responsive," state after the client fails to respond to a system defined number

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of polls. The NON_RESP state is almost identical in terms of state transition to idle state, a difference being that an IDLE poll response transitions the client into an IDLE state.

Figure 8 is a Hybridware™ client state diagram for upstream channel allocation of the hybrid access system 1 according to an embodiment of the present invention, involving two way cable communication. According to this embodiment, the hybrid upstream client protocol has three states, IDLE 401, CON_REQ, i.e., "connect request" 402, and ACTIVE 404. In the IDLE state, the client, when polled, will transmit an IDLE poll response, if there is no request from the application. However, it will respond with a channel request message, if there is data that needs to be sent upstream. Upon transmitting a channel request message, the client transitions to a CON_REQ state. In the CON_REQ state, the client expects one of two messages from the hybrid router, a channel ~~allocation~~ available or a no-channel allocation signal. Upon receiving a channel allocation message, the client informs the application and tunes to the channel it was allocated and transitions to the ACTIVE state. Upon receiving a no-channel available message, the client informs the application and transitions to the IDLE state. In the ACTIVE state, the client forwards data messages from the application to the upstream transmitter. In the ACTIVE state, the client further monitors the application activity and if it detects that no data has moved from the application to the upstream transmitter for a system defined period of time, it will send a channel deallocation request and transition to an idle state. In an ACTIVE state, the application may explicitly request that the channel be released, in which case the client will send a channel deallocation request to the hybrid router and will transition to the IDLE state. In the ACTIVE state, the client

periodically sends an operability indication message to the server. If the client receives a poll message during the ACTIVE state, it will send a channel request message and will transition to a CON_REQ state. The hybrid router may also send an unsolicited channel release message, in which case the client will notify the application and transition from ACTIVE state to IDLE state.

Figure 9 is a logical data flow diagram showing data flows between server and client computers of the hybrid access system 1 according to the present invention, for multiple clients under an address allocation protocol simplifying distribution of ip addresses to remote systems. The protocol according to the present invention determines where a given Hybridware™ client is located and how to download its ip address, given that the client has no address yet. Hybrid access system 1 includes a server application 70, a hybrid system manager 71, and Hybridware™ servers 72a & 72b connected to LAN 38. Hybrid access system 1 further includes Hybridware™ clients 73a and 73b and client applications 74a and 74b operating with respective ones of Hybridware™ clients 73a and 73b. Hybridware™ client 73a communicates with Hybridware™ server 72a, as transmitter along upstream channel 75a or as receiver along downstream channel 76a. Hybridware™ client 73b communicates with Hybridware™ server 72b, as transmitter along upstream channel 75b or as receiver along downstream channel 76b. Downstream data traffic is expected to be higher capacity than upstream data traffic: Hence, the bolder depiction of downstream channels 76a and 76b than upstream channels 75a and 75b.

Figure 10 is a flow chart of address allocation control according to an embodiment of the present invention to logon and configure Hybridware™

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clients with a selected unique node name which is entered in the configuration database in the hybrid system manager 71 which is the software portion of network management system 37. In particular, hybrid system manager 71 sends 500 a new client message to all hybrid routers 72a and 72b after learning of particular new clients by message, mail, or telephone call. At this point the hybrid system manager is aware of a Hybridware™ client identification name and equipment serial number, but has not associated the client identification name with a separate unique client address (e.g., Internet Protocol, or IP address) provided by separate automatic registration. Each hybrid router 72a and 72b periodically broadcasts 501 a configuration poll message. Hybridware™ clients recognize 502 their preselected unique names during a configuration poll. Hybridware™ clients 72a and 72b respond to the configuration poll. Hybrid routers 72a and 72b receive respective configuration poll responses. Then, hybrid routers 72a and 72b send respective client found messages to system manager 71. System manager 71 then sends a cease configuration poll message to all hybrid routers. Further, system manager 71 allocates an Internet protocol (IP) address and other configuration data for each new client according to the preselected unique names. System manager 71 sends the IP address and other configuration data to the applicable hybrid router 72a, 72b. Then, the applicable hybrid router 72a, 72b sends using broadcast or unicast and the unique name the corresponding IP address and other configuration data to the applicable Hybridware™ client. As a result, the Hybridware™ client receives the IP address and other configuration data determined and reconfigures appropriately. In summary, according to the present invention, an automatic address allocation and configuration method in transmissions employs a hybrid access system. Remote users are identified initially with a

unique abstract name, e.g., "Bob," and this abstract name is registered by the network management system. Configuration is established by the upstream routers polling the remote users and registering the location of the remote user responding to the poll made with the particular abstract name. Upstream channel allocation is accordingly made subject to the configuration made including abstract name and identified location. Automatic address allocation and configuration is accordingly accomplished on line at an initial log-on session with a new user. The method of the present invention is accordingly swift and simple, eliminating registration delays experienced by many known log-in systems.

Figure 11 is a state diagram of the hybrid adaptive gain control protocol according to the present invention, which overcomes noise and attenuation while transmitting on cable in an upstream direction. The hybrid adaptive gain control protocol has a searching state 600 and a stable state 601. In the stable state 601, the protocol evaluates poll messages from the hybrid router. If a poll message indicates loss of a poll response, the protocol transitions to the searching state 600. Poll responses are transmitted at a fixed power level. In the searching state 600, the client system responds to polls with a poll response at larger and larger power levels. After receiving a system specified, number of consecutive polls with an indication of a successful poll response, the system transitions to a stable state.

Figure 12a is a transmission diagram of information exchange between nodes A and B. Nodes A and B comprise an asymmetric network according to the present invention, having a high downstream data rate of n bits per second and a lower upstream data rate of m bits per second. The downstream data rate n is greater than the upstream data rate m. Node B includes receive

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and transmission queues to hold information received and to be sent, including acknowledge indications or messages. The acknowledge suppression method according to the present invention relates to the node or system transmitting data acknowledgments, which acknowledges receipt of either data packets or data bytes contained in incoming packets. The numbers on data packets indicate the position of the last data byte of the packet in the data stream, and the acknowledgment numbers indicate that all the bytes of the data stream up to and including the byte indicated have been received. According to the method of the present invention, the acknowledgment of byte k (or packet number k) indicates that all bytes or packets prior to k have been received. According to a method of the present invention, the transmit queue queues up additional acknowledgment packets as new packets are received. Figure 12b is a diagram of messaging of first through fourth data packets, 100, 250, 325, and 450, between upstream and downstream nodes, in parallel with upstream transmission of receipt acknowledge indications with respect to only two data packets, namely 250 and 450. Figure 12c is a diagram indicating acknowledgment of first and second packet receptions during a first time period. In particular, packet 1 (i.e., "pkt 1") is currently being sent, and an acknowledge (i.e., "ack 250") message is currently being appended at the end of the transmit queue. Figure 12d is a diagram indicating acknowledgment of another packet during another period. Figure 12e is a diagram indicating no need for an acknowledge 100 signal in view of a ~~prior~~ subsequent acknowledgment having been successful. In particular, according to the acknowledge suppression method of the present invention, not all acknowledgment packets will be sent to node A, because the "ack 210" message carries information which supersedes the "ack 100" message. Accordingly, the amount of traffic on the

communication link from B to A is reduced, according to the present invention. In general, this introduces an acknowledge latency , but where all messages queued up for transmission are acknowledgments, acknowledgment latency is reduced. For example, when an "ack 15" signal is transmitted and an "ack 100" message awaits transmission, and an "ack 210" message is appended to the queue, the acknowledge suppression method according to the present invention will delete the "ack 100" message as superfluous. Any new acknowledgments appended while "ack 15" is being transmitted will result in deletions of unnecessary acknowledgments keeping queue length to two. Upon transmit completion of "ack 15," the next acknowledgment, e.g., "ack 210" will be transmitted. Accordingly, the method of the present invention eliminates unnecessary transmission of "ack 100" signals and provides for reduced acknowledgment latency for "ack 210." The ack suppression method according to the present invention, accordingly reduces the probability of queue overflow and potential out of memory conditions in system B. It reduces the load on the communication link from B to A, and in some circumstances reduces acknowledgment latency for data transfers from B to A. Figure 12f is a diagram of first through fourth network nodes serially connected to each other in accordance with the present invention, wherein the link between the first and second nodes is symmetric, the link between the second and third nodes is asymmetric and that between the third and fourth nodes is symmetric. The acknowledge suppression method of the present invention applies to both the communications system of Figure 12a, in which nodes A and B are end nodes, as well as to the communications system of Figure 12f, in which nodes B and C are intermediate systems such as a router, and data packets

originating at node D are transmitted through router nodes C and B to a central system connected to node A.

Figure 13 is a tabular description of a transmission control protocol/ Internet protocol (TCP/IP) data transmission packet protocol header as used in connection with the present invention. The first five 32 bit words and the following IP options are referred to as the IP header. The five words following the IP options together with the words containing TCP options are referred to as the TCP header. The non-ack TCP header is the TCP header less the acknowledgment number field.

Figure 14a shows sequential data transmission between first and second nodes, according to the present invention. As shown in Figure 14a, data packets ~~or~~ bytes 100-700 are transmitted from node A to node B. Concomitantly, acknowledge messages, "ack 100," "ack 200," and "ack 300," were dispatched from node B to node A.

Figure 14b shows a data packet sequence of packets 100-400 held in the transmit queue during a first time period, followed by a single acknowledgment, "ack 100."

Figure 14c is a diagram of a data packet sequence transmitted during a later time period, eliminating retransmission of the 300 packet, because another 300 packet was already in the transmission buffer.

Figure 15 is a flow diagram of an acknowledge suppression (AS) method, i.e., an AS method, according to the present invention in which receipt of information transmitted from system A to system B over a first independent simplex communication link is acknowledged by system B. The

method of the present invention starts 1500 at a particular time, and a first packet Mi of information is received 1501. If the transmit queue is not empty 1502, the header of the last packet Mi+1 on the transmit queue is obtained 1503. If the transmit queue is empty 1502, then Mi is enqueued 1509 and the AS method according to the present invention is completed. If the header of the ~~last~~ next packet Mi+1 on the transmit queue equals 1504 the header of packet Mi, and the NON-ACK TCP header of Mi equals 1505 the NON-ACK TCP header of Mi+1 then Mi+1 is discarded 1506. If the header of the last packet Mi+1 on the transmit queue does not equal 1504 the header of packet Mi, or the NON-ACK TCP header of Mi does not equal 1505 the NON-ACK TCP header of Mi, then Mi is enqueued 1509 and the AS method according to the present invention is completed. If Mi+1 is not the last message on the queue 1507, then ~~the~~ header on the next packet Mi+1 on the transmit queue is obtained 1508, and a comparison is done to determine whether the header of the last packet Mi+1 on the transmit queue equals 1504 the header of packet Mi. If Mi+1 is the last message on the queue 1507, then Mi is enqueued 1509 and the AS method according to the present invention is completed.

Figure 16 is a flow diagram of the packet suppression (PS) method according to the present invention. The method of the present invention starts 1600 at a particular time, and a first packet Mi of information is received 1601. If the transmit queue is not empty 1602, the header of the last packet Mi+1 on the transmit queue is obtained 1603. If the transmit queue is empty 1602, then Mi is enqueued 1609 and the PS method according to the present invention is completed. If the header of the last packet Mi+1 on the transmit queue equals 1604 the header of packet Mi, then Mi+1 is discarded 1606. If the header of the last packet Mi+1 on the transmit queue does not

equal 1604 the header of packet Mi, then Mi is enqueued 1609 and the PS method according to the present invention is completed. If Mi+1 is not the last message on the queue 1607, then the header on the next packet Mi+1 on the transmit queue is obtained 1608, and a comparison is done to determine whether the header of the last packet Mi+1 on the transmit queue equals 1604 the header of packet Mi. If Mi+1 is the last message on the queue 1607, then Mi is enqueued 1609 and the PS method according to the present invention is completed.

Figure 17 is a flow diagram of information exchanges between Hybridware™ server and client, according to conditions in which the client has no data to transmit. A credit (1, F) corresponding to a single predetermined amount of data, e.g., ten bytes, or ten packets, at a selected frequency F is transmitted from node A to node B, and a done signal DONE(0,0) is transmitted from node B to node A, indicating that no data packet was transmitted, leaving the existing credit level of the particular channel unchanged. The credit protocol according to the present invention permits single upstream cable channels to be shared by multiple remote link adapters. Alternatively, a single upstream channel is controlled and used by a single remote link adapter until the channel is relinquished. The present invention includes an allocation method in transmissions employing a hybrid access system. According to a method of the present invention, an upstream channel is shared by a plurality of remote link adapters in accordance with a credit criterion, and credit control packets are dispatched to a remote link adapter which permit the remote link adapter to send data packets to arbitrary hosts. Upon sending a data packet, the remote link adapter returns the credit control packet to a Hybridware™ server. A credit permits a remote link adapter to send a certain number of

packets up to a maximum number controlled by a configuration parameter MAX_ CREDIT_ PACKETS, thereby eliminating polling for that period. If a remote link adapter does not have a data packet to send, it returns the credit to the hybrid access system without sending any data packets. The remote link adapter then sets a field in the credit control packet to the number of packets which was sent. If the protocol process at the server does not receive credit status information from the credit control packet within a certain credit time-out, CREDIT_TIMEOUT, in milliseconds, for a certain number of times, FAIL_CNT, consecutively, the remote link adapter is assumed to be in error and is put in a not-responding state (NON-RESP). The overall upstream channel performance of a remote link adapter using a credit channel is lower than a remote link adapter on a sole use upstream channel. If any sole use upstream channel becomes available, this channel is given to the credit remote link adapter that has been waiting the longest for a sole use upstream channel that currently has packets to send.

Figure 18 is a flow diagram of information exchanges between Hybridware™ server and client, according to conditions in which the client has information to transmit and the server gradually allocates bandwidth to the client. In particular, a node first provides a single credit at a selected frequency f_1. Then a packet is sent, consuming the credit, followed by a completion message indicating use of one credit and potential for an additional transmission corresponding to three credits. Next, a credit is provided corresponding to two packets at the selected frequency f_1, which is followed by two packet transmissions and a completion message indicating consumption of two credits and potential for transmission of one more. In response, another double credit is sent, followed by a single packet and an

acknowledgment of transmission of one and potential for no more transmissions.

Figure 19 is a flow diagram of information exchanges between Hybridware™ server and client, according to conditions in which the server allocates the client a dedicated channel, the client transmits data and periodically reports to the server with done messages. In particular, a credit indication dedicating a channel at frequency F is provided, followed by 235 packet transmissions. According to prearrangement, an operability indication in the form of a DONE message is provided at an established time indicating potential for five more packet transmissions. The done message indicates completion of 235 packet transmissions, as an accounting function. Because the channel is dedicated, further packet transmissions are made without specific further credit allocations.

Figure 20 is a flow diagram of information exchanges between Hybridware™ server and client, according to conditions in which a dedicated channel is converted into a shared channel. In particular, a credit indication is provided, followed by transmission of 235 packets and a credit message stopping channel dedication and switching to a credit mode. Responsive to the credit message a DONE signal accounts for the 235 packets transmitted during the dedicated mode and indicates potential for five more transmissions. This is followed by a credit allocation of one at a selected frequency. Thus, one packet is transmitted, followed by a completion indication specifying potential for four more packets to be transmitted.

What is claimed is:

1. A hybrid access system for connecting at least a single client data processor with a network, comprising:

a local area network (LAN) system;

a hybrid system manager connected to said LAN system;

a downstream router connected to said LAN system for transmitting information;

an upstream router connected to said LAN system for receiving information, said upstream bridge router including a Hybridware™ server,

a broadcast unit connected to said downstream router;

a downstream channel connected to said broadcast unit for high speed transmission of information on said high speed downstream channel;

an independent upstream channel connected to said upstream router, which operates at a lower speed than said downstream channel;

at least a single remote link adapter connected to said upstream and downstream channels; and

a corresponding at least a single client data processor connected to said remote link adapter.

2. The hybrid access system according to claim 1, wherein said independent upstream channel includes a telephone network.

3. The hybrid access system according to claim 1, wherein said independent upstream channel includes a cable TV network.

4. The hybrid access system according to claim 1, wherein said independent upstream channel includes a wireless transmission path.

~~5. The hybrid access system according to claim 1, wherein said LAN system includes a LAN switch and a router.~~

6. The hybrid access system according to claim 1, wherein said broadcast unit includes at least one of a group consisting of a cable TV headend, a wireless TV transmitter, a satellite transmitter and a cell site.

7. A method of accessing a wide area network from any of a plurality of client processors each connected to an asymmetric hybrid network including high-speed downstream and lower-speed upstream channels controlled by a hybrid system manager and a router server, including the steps of:

providing a polling signal from a hybrid system manager to client processors,

issuing an upstream channel connection request by lower speed channel, if no upstream data channel is currently assigned to a client data processor,

conducting login communications between the router server and the system manager,

verifying authorized user status at the system manager level,

allocating an upstream channel by high speed downstream channel message, and

sending upstream data over the allocated lower speed upstream channel of the asymmetric hybrid access network.

8. The method according to claim 7, wherein providing a polling signal includes polling clients in an idle state at a selected frequency level of polling.

9. The method according to claim 7, wherein providing a polling signal includes polling clients in a blocked state at a selected frequency level of polling.

10. The method according to claim 7, wherein providing a polling signal includes polling clients in a non-responsive state at a selected frequency level of polling.

11. The method according to claim 7, wherein providing a polling signal includes polling clients in idle and blocked states at selected first and

second frequency levels of polling, and polling of clients in an idle state occurs more frequently than polling of clients in a blocked state.

12. The method according to claim 7, wherein providing a polling signal includes polling clients in idle and non-responsive states at selected first and second frequency levels of polling, and polling of clients in an idle state occurs more frequently than polling of clients in a non-responsive state.

13. The method according to claim 7, wherein idle clients are polled multiple times during a poll cycle and polling of blocked and non_resp clients is distributed evenly over a poll cycle to assure that the latency for acquiring a channel for idle units is uniform.

14. The method according to claim 7, wherein polling includes grouping clients by state and polling within each group round robin.

~~15. A method of high speed remote access of a wide area network~~ from any of a plurality of client processors each ~~connected~~ to an asymmetric hybrid network including high-speed ~~downstream~~ and lower-speed upstream channels controlled by a hybrid system manager and a router server, including the steps of:

issuing an upstream channel authorization request by lower speed ~~channel~~, for upstream data channel currently used by a particular client data ~~processor~~,

~~conducting login communications between the router server and the~~ system manager,

verifying authorized user status at the system manager level,

authorizing specific upstream channel use by high speed downstream channel message, and

sending upstream data over the allocated lower speed upstream channel ~~of the asymmetric hybrid access network.~~

16. A method of high speed remote access of a wide area network from any of a plurality of client processors each connected to an asymmetric hybrid network including high-speed downstream and lower-speed upstream channels controlled by a hybrid system manager and a router server, including the steps of:

sending a new client message to a plurality of hybrid routers, which provides client names,

broadcasting a poll message to a plurality of clients using client names,

recognizing a client name,

providing a poll response,

receiving a poll response,

reporting a client found to a system manager,

ceasing polling,

providing an address to the client which responded to poll,

receiving the address sent, and

configuring the client with the address provided.

17. A method of transmitting data from an upstream transmit queue in an upstream transmitter node to a selected receiver node, comprising the steps of:

transmitting selected amounts of data from a transmit queue in a first node to a second node,

generating acknowledgments of data received by said second node,

eliminating from the transmit queue of the second node data acknowledgments which are redundant of other acknowledgments in said second transmit queue, and

filling open transmit queue spaces with additional data.

18. A method of determining polling frequency from an upstream communications mode of a hybrid access system with respect to a plurality of downstream nodes having polling status levels corresponding to activity states in which a remote link adapter may be set, comprising the steps of:

determining the priority status of predetermined remote link adapters in a hybrid access system; and

polling the remote link adapter having the highest priority status level.

19. A method of setting remote link adapter power level in a hybrid access system, comprising the steps of:

transmitting successive indications to a hybrid upstream router at selected different power levels,

confirming receipt of a first power level indication, and

setting the level of future transmissions to a power associated with confirmation of receipt.

20. A method of packet suppression in communication between first and second nodes having respective first and second transmit and receive queues, in which information packets having headers are transmitted from said first node to said second node, comprising the steps of:

loading the transmit queue of said first node with a first information packet;

loading a second information packet into the transmit queue of said first node;

checking the headers of said first and second information packets, and

suppressing one of said first and second information packets, if the headers are the same.

21. A method of credit administration between first and second computer nodes, for information amounts having predetermined information credit values, comprising the steps of:

sending a credit to a first computer node, which sets a response frequency;

receiving an information amount corresponding in value up to the amount of the credit received at said first computer node at said response frequency; and

sending a done signal to said second computer node indicative of the credit received less the amount of information received.

22. A method of operating a client node, comprising the steps of:

sending periodic operability indication messages during an active state,

receiving a poll message, and requesting channel connection.

23. A method of operating a server node, comprising the steps of:

receiving periodic operability indication messages during an active state,

sending a polling message, when a threshold interval has expired,

awaiting a poll response, and

entering a non-responsive state if response to polling is received.

~~24. A method of responding to detected quality levels in a~~ communication channel, comprising the steps of:

detecting a quality characteristic with respect to a selected communication channel from a selected group of quality characteristics each which is defined by quantitative levels,

determining whether the quantitative level of the detected quality characteristic deviates with respect to a predefined norm, and

switching to another communication channel, if sufficient deviation is ~~determined~~

25. The method ~~according~~ to claim 24, wherein said group of quality characteristics includes time from last operability indication, signal to noise ~~ratio, and error frequency.~~

Add B7

426,920

Abstract of the Disclosure

A hybrid access system and method using a hybrid access system point of presence router and a remote link adapter to connect a user computer terminal to a network for fast downstream information transfer by high speed information broadcasting with lower speed upstream information transfer through an independent upstream channel to the hybrid access system point of presence router. High speed downstream information transfer passes through a cable TV headend or a TV transmitter or a cell station.

What is claimed is:

1. ~~A hybrid access system for connecting at least a single client data~~ processor with a network, comprising:

a local area network (LAN) system;

a hybrid system manager connected to said LAN system;

a downstream router connected to said LAN system for transmitting information;

an upstream router connected to said LAN system for receiving information, said upstream bridge router including a Hybridware™ server,

a broadcast unit connected to said downstream router;

a downstream channel connected to said broadcast unit for high speed transmission of information on said high speed downstream channel;

an independent upstream channel connected to said upstream router, which operates at a lower speed than said downstream channel;

at least a single remote link adapter connected to said upstream and downstream channels; and

a corresponding at least a single client data processor connected to said ~~remote link adapter.~~

2. The hybrid access system according to claim 1, wherein said independent upstream channel includes a telephone network.

EXHIBIT B

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

ORIGINAL, CONTINUATION OR DIVISIONAL

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

the specification of which (check one):

[X] is attached hereto.
[] was filed on: _____
Application Serial No.: _____
and was amended on: _____ (if applicable)

[] was described and claimed in PCT International Application No. _____
filed on: _____
and as amended under PCT Article 19 on: _____

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign or PCT Application(s): **n/a**

Application Number	Country (or indicate if PCT)	Day/Month/Year Filed	Priority Claimed? Yes	No
			[]	[]
			[]	[]

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

Prior U.S. Application(s) or PCT International Application(s) Designating the U.S. for Benefit Under 35 USC §120: **n/a**

U.S. Application Serial No.	U.S. Filing Date	Patented	Pending	Abandoned

PCT Applications Designating the U.S.:

PCT Application No.	PCT Filing Date	U.S. Serial Nos. Assigned (if any)	Patented	Pending	Abandoned

Case Docket No. 1572

EXHIBIT B

ALL-STATE LEGAL SUPPLY CO.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Judson D. Cary, Reg. No. P-38,097
Timothy H. Gens, Reg. No. 29,153
Charles E. Gotlieb, Reg. No. P-38,164
David L. Hayes, Reg. No. 34,638
Kenneth M. Kaslow, Reg. No. 32,246
Stuart P. Meyer, Reg. No. 33,426
John T. McNelis, Reg. No. 37,186
Leo V. Novakoski, Reg. No. 37,198
Edward J. Radlo, Reg. No. 26,793
Robert P. Sabath, Reg. No. 29,107
Albert C. Smith, Reg. No. 20,355
Phong K. Truong, Reg. No. 37,499
J. P. Violette, Reg. No. 33,042
Edward B. Weller, Reg. No. 37,468

SEND CORRESPONDENCE TO:	DIRECT TELEPHONE CALLS TO: (name and telephone number)
Robert P. Sabath FENWICK & WEST Two Palo Alto Square, Suite 500 Palo Alto, CA 94306	Robert P. Sabath (415) 858-7153

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

1-00

Full Name of Inventor: Eduardo J. Moura

Signature: Eduardo J. Moura Dated: 4/21/95

Residence: 3509 Mt. Davidson Court, San Jose, CA 95124 Citizenship: U.S.A.

Post Office Address: same as residence

2-00

Full Name of Inventor: Jan Maksymilian Gronski

Signature: Jan M Gronski Dated: 4/21/95

Residence: 705 Newell Road, Palo Alto, CA 94303 Citizenship: U.S.A.

Post Office Address: same as residence

Case Docket No. 1572

Attny. Dkt. No.: 1572
Applicants: Eduardo J. Moura and Jan Maksymiliam Gronski
Serial No.: Unknown
Filed: Even Date Herewith
Title: ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9 (f) and 1.27 (c)) - **SMALL BUSINESS CONCERN**

I hereby declare that I am:

[ ] the owner of the small business concern identified below: [X] an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN Hybrid Networks, Inc.
ADDRESS OF CONCERN 10201 Bubb Road, Cupertino, CA 95014

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.2--18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under section 41 (a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the ~~above~~ referenced invention described in

[X] the specification filed herewith [ ] application identified above [ ] patent identified above

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventors, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 1.9(d) or a nonprofit organization under 37 CFR 1.9(e). *NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

*NAME _____
ADDRESS _____
[ ] INDIVIDUAL [X] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of the Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

SIGNATURE _____ DATE 4/21/95
NAME OF PERSON SIGNING RICHARD E. FULLER
TITLE OF PERSON OTHER THAN OWNER VP, FINANCE
ADDRESS OF PERSON SIGNING 10201 BUBB RD., CUPERTINO, CA 95014

18323-01572/312023.1/04-20-95/04:58 PM

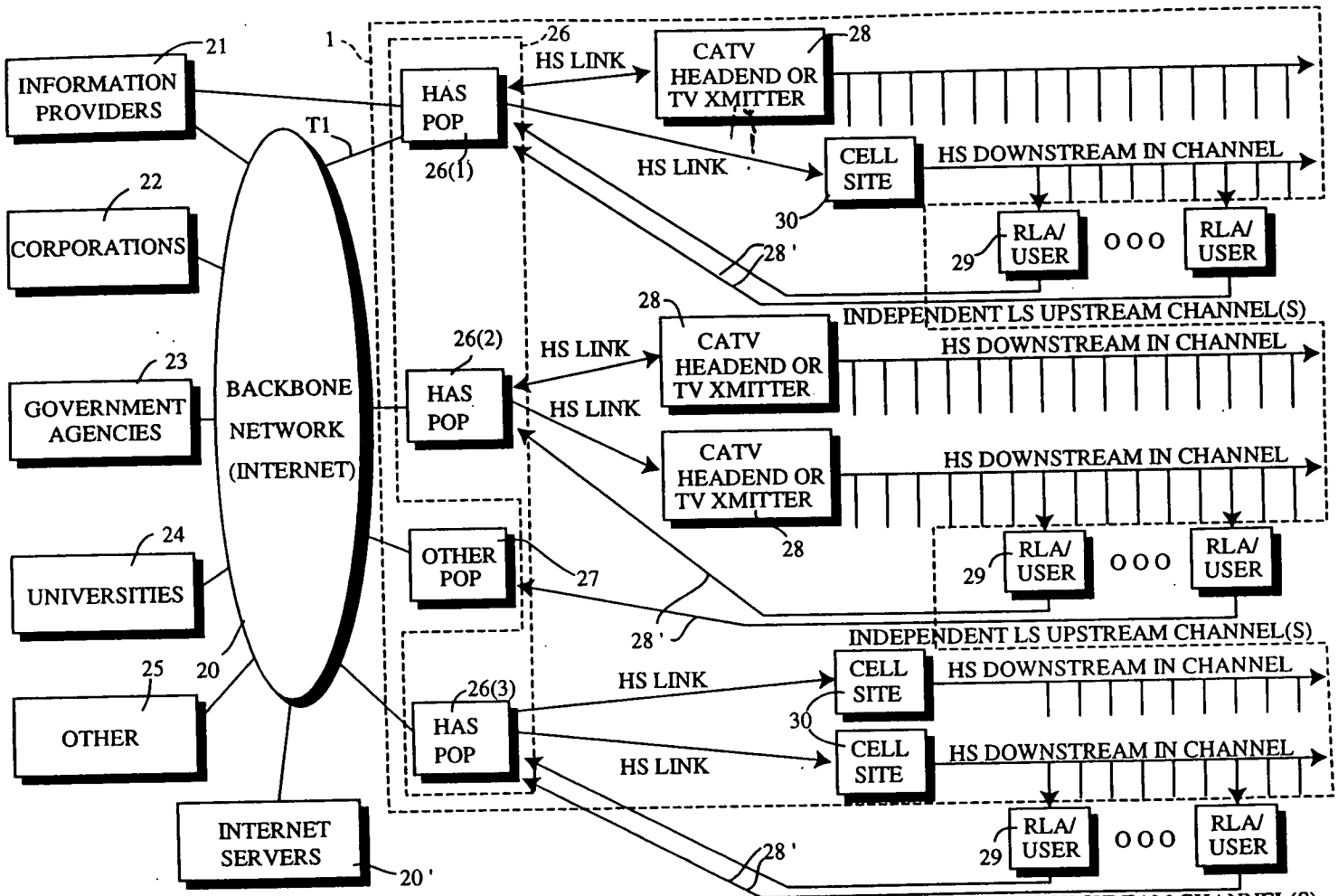

FIGURE 1

31

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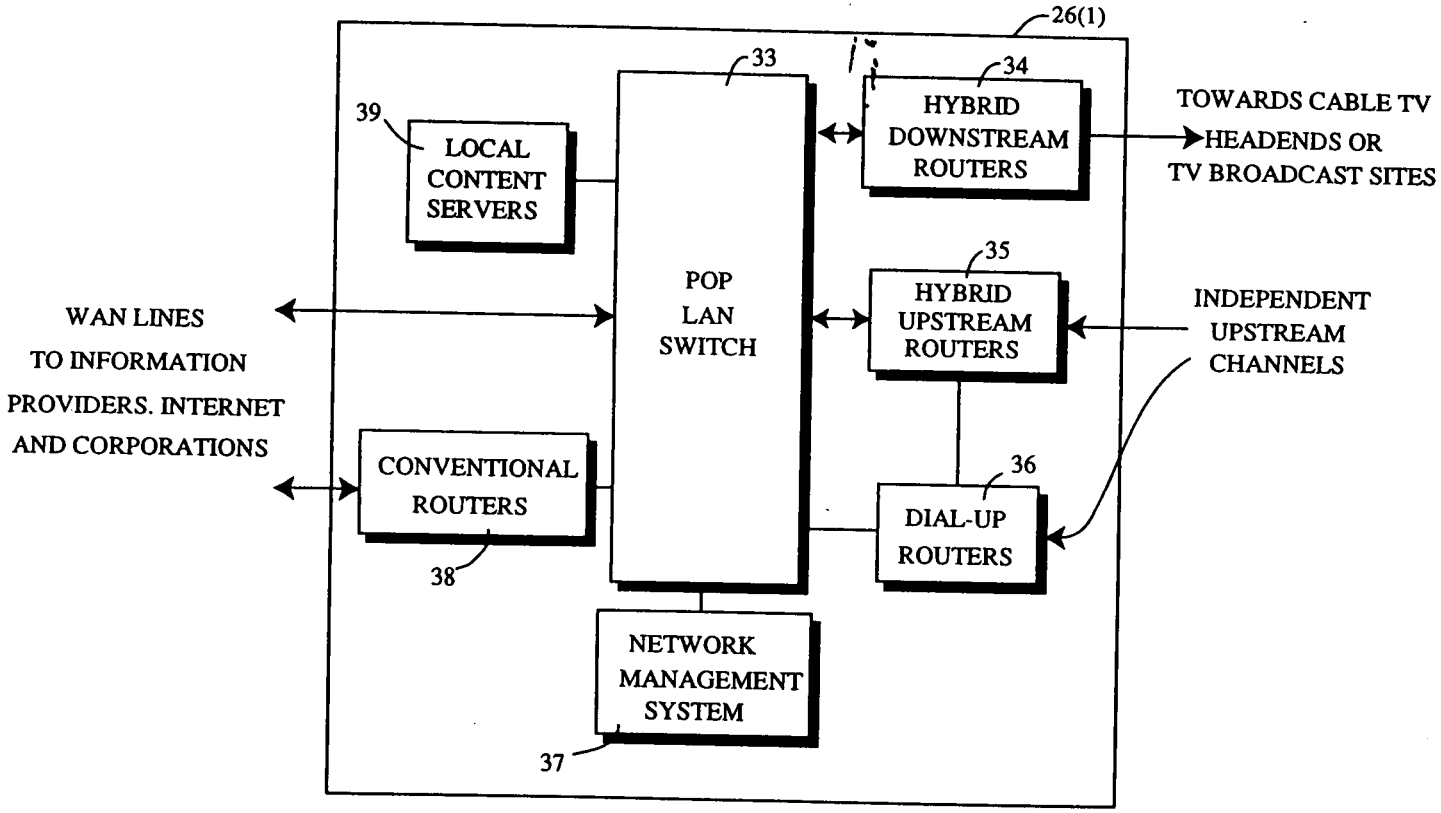

FIGURE 2a

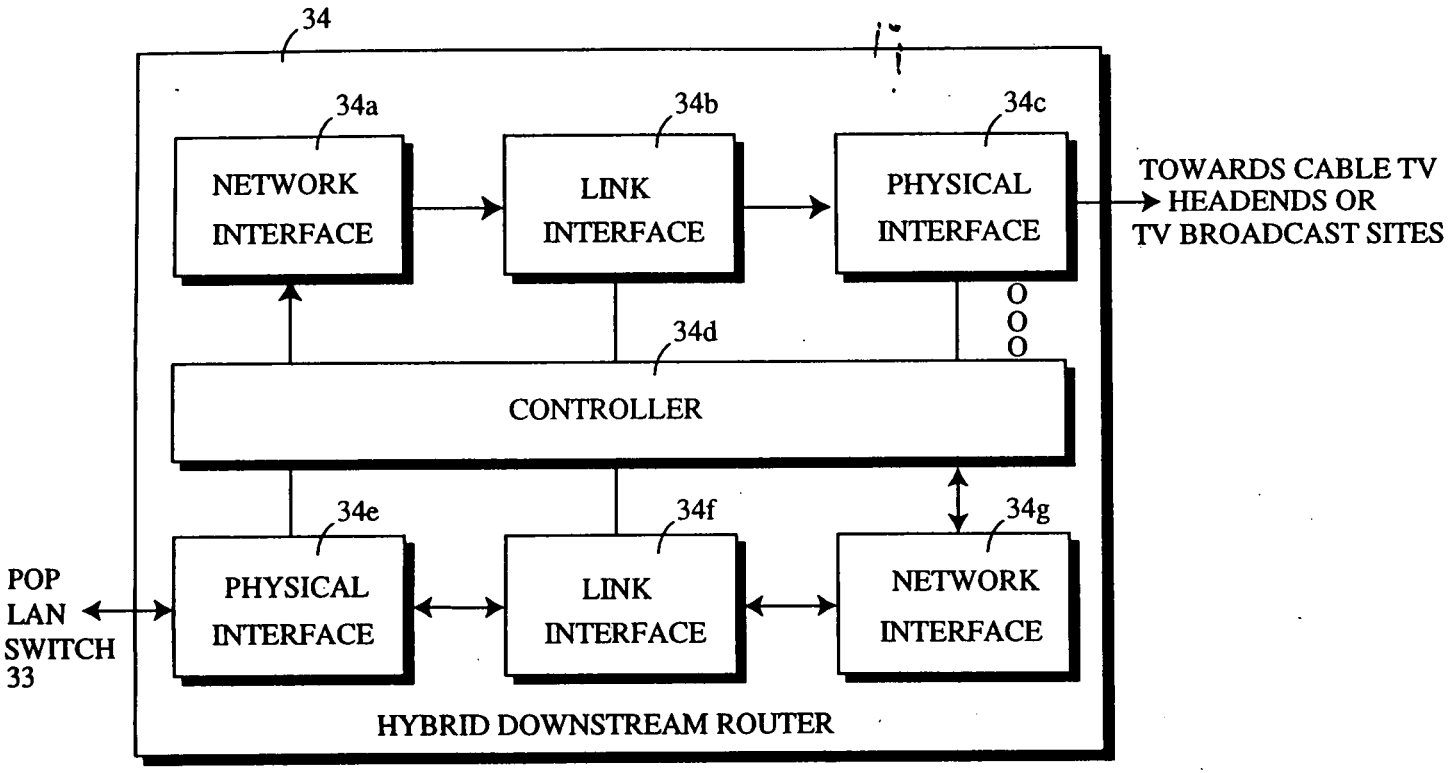

FIGURE 2b

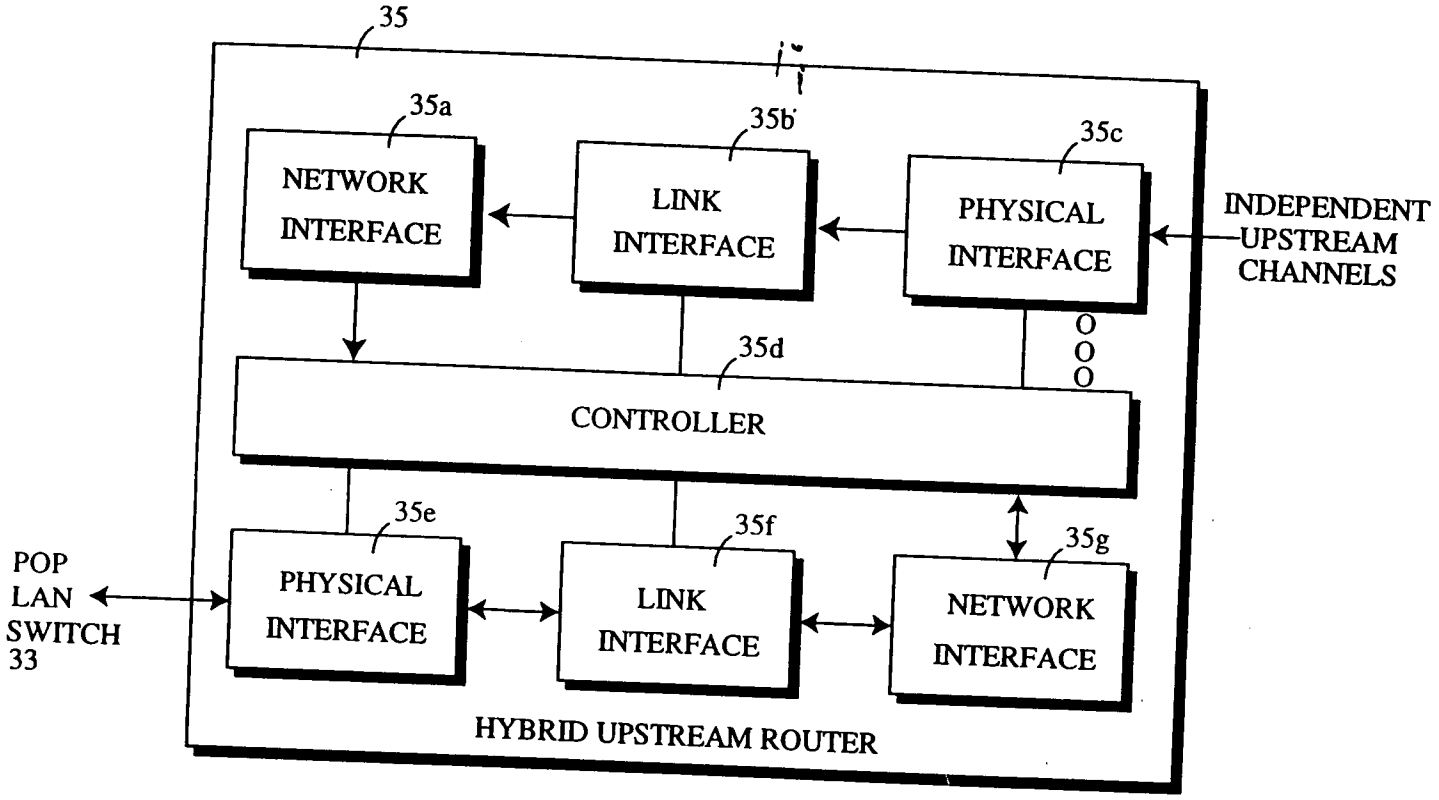

FIGURE 2c

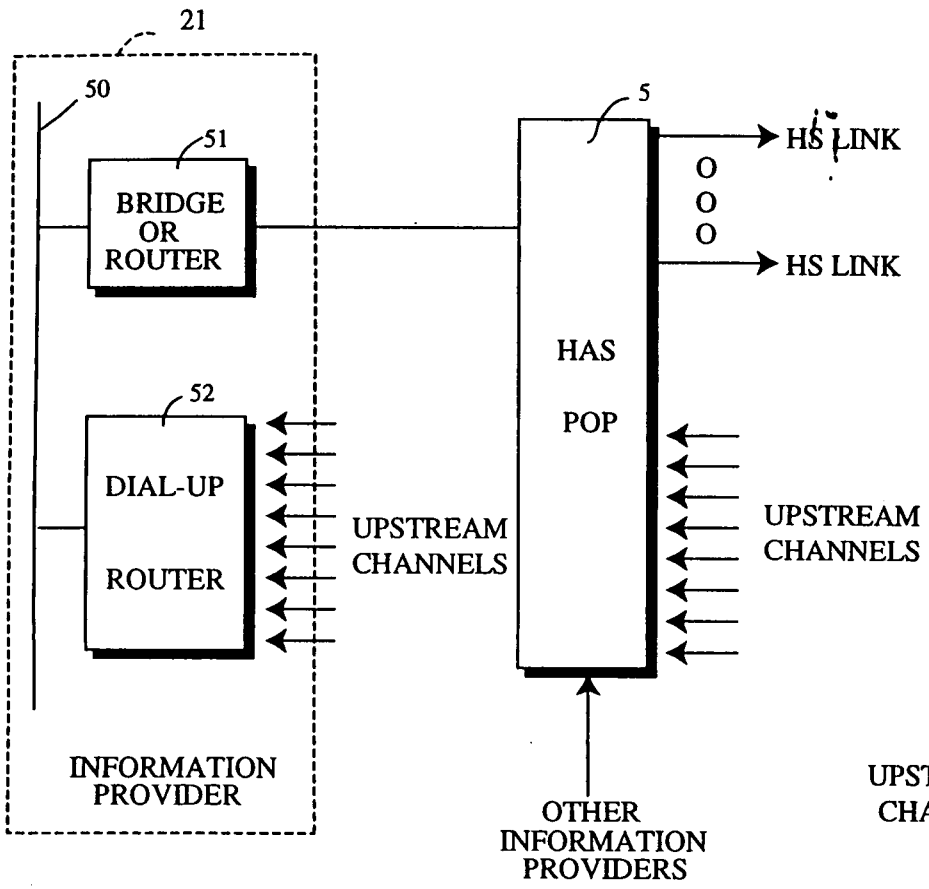

FIGURE 3a

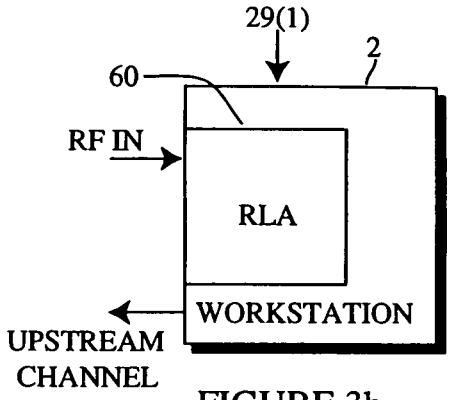

FIGURE 3b

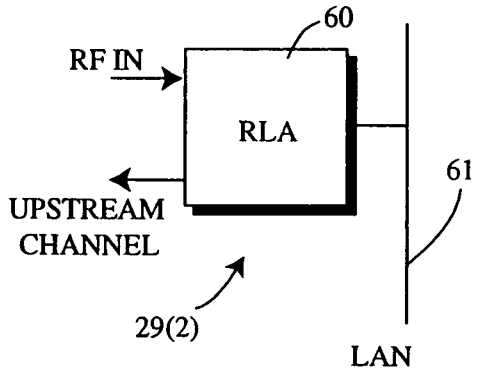

FIGURE 3c

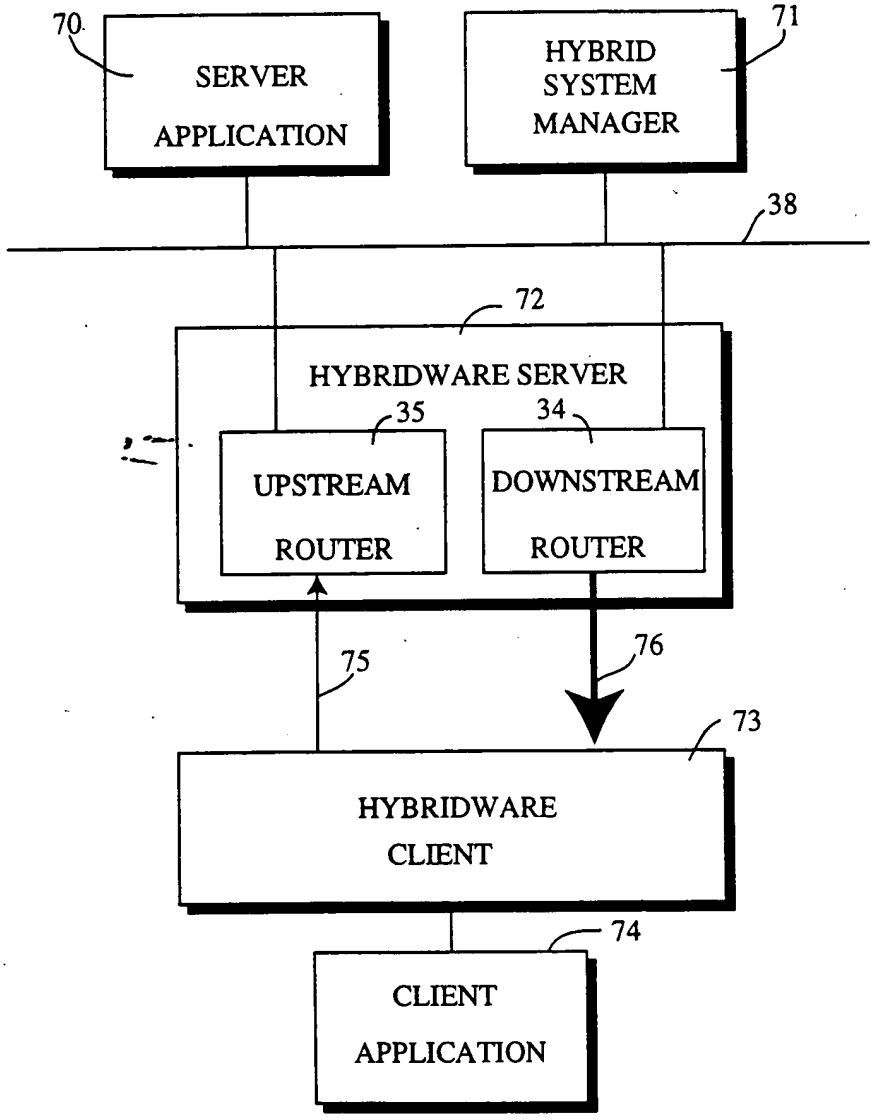
70
SERVER APPLICATION
71
HYBRID SYSTEM MANAGER
38
72
HYBRIDWARE SERVER
35
34
UPSTREAM ROUTER
DOWNSTREAM ROUTER
75
76
73
HYBRIDWARE CLIENT
74
CLIENT APPLICATION

FIGURE 4

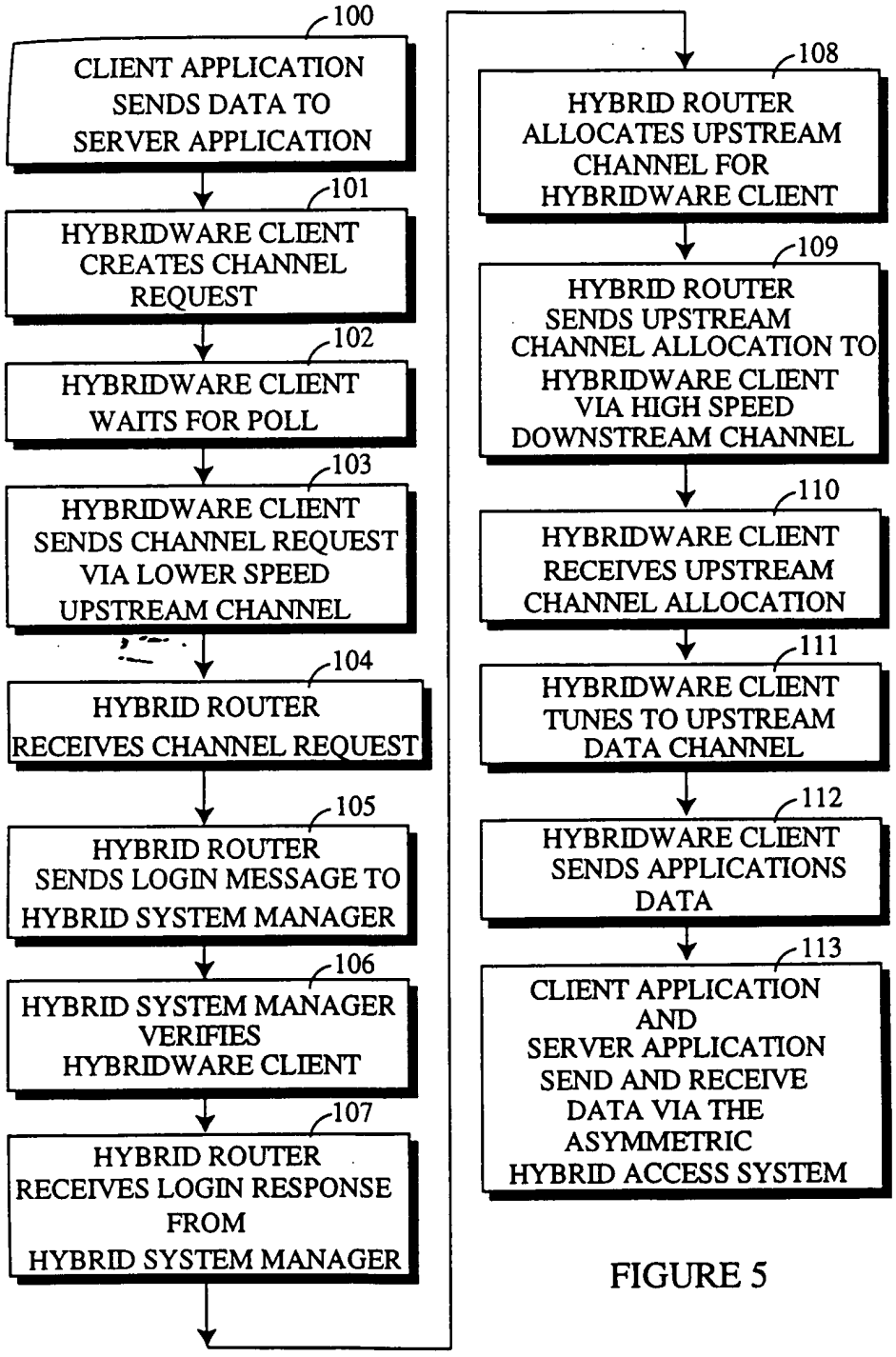
100
CLIENT APPLICATION SENDS DATA TO SERVER APPLICATION
101
HYBRIDWARE CLIENT CREATES CHANNEL REQUEST
102
HYBRIDWARE CLIENT WAITS FOR POLL
103
HYBRIDWARE CLIENT SENDS CHANNEL REQUEST VIA LOWER SPEED UPSTREAM CHANNEL
104
HYBRID ROUTER RECEIVES CHANNEL REQUEST
105
HYBRID ROUTER SENDS LOGIN MESSAGE TO HYBRID SYSTEM MANAGER
106
HYBRID SYSTEM MANAGER VERIFIES HYBRIDWARE CLIENT
107
HYBRID ROUTER RECEIVES LOGIN RESPONSE FROM HYBRID SYSTEM MANAGER
108
HYBRID ROUTER ALLOCATES UPSTREAM CHANNEL FOR HYBRIDWARE CLIENT
109
HYBRID ROUTER SENDS UPSTREAM CHANNEL ALLOCATION TO HYBRIDWARE CLIENT VIA HIGH SPEED DOWNSTREAM CHANNEL
110
HYBRIDWARE CLIENT RECEIVES UPSTREAM CHANNEL ALLOCATION
111
HYBRIDWARE CLIENT TUNES TO UPSTREAM DATA CHANNEL
112
HYBRIDWARE CLIENT SENDS APPLICATIONS DATA
113
CLIENT APPLICATION AND SERVER APPLICATION SEND AND RECEIVE DATA VIA THE ASYMMETRIC HYBRID ACCESS SYSTEM

FIGURE 5

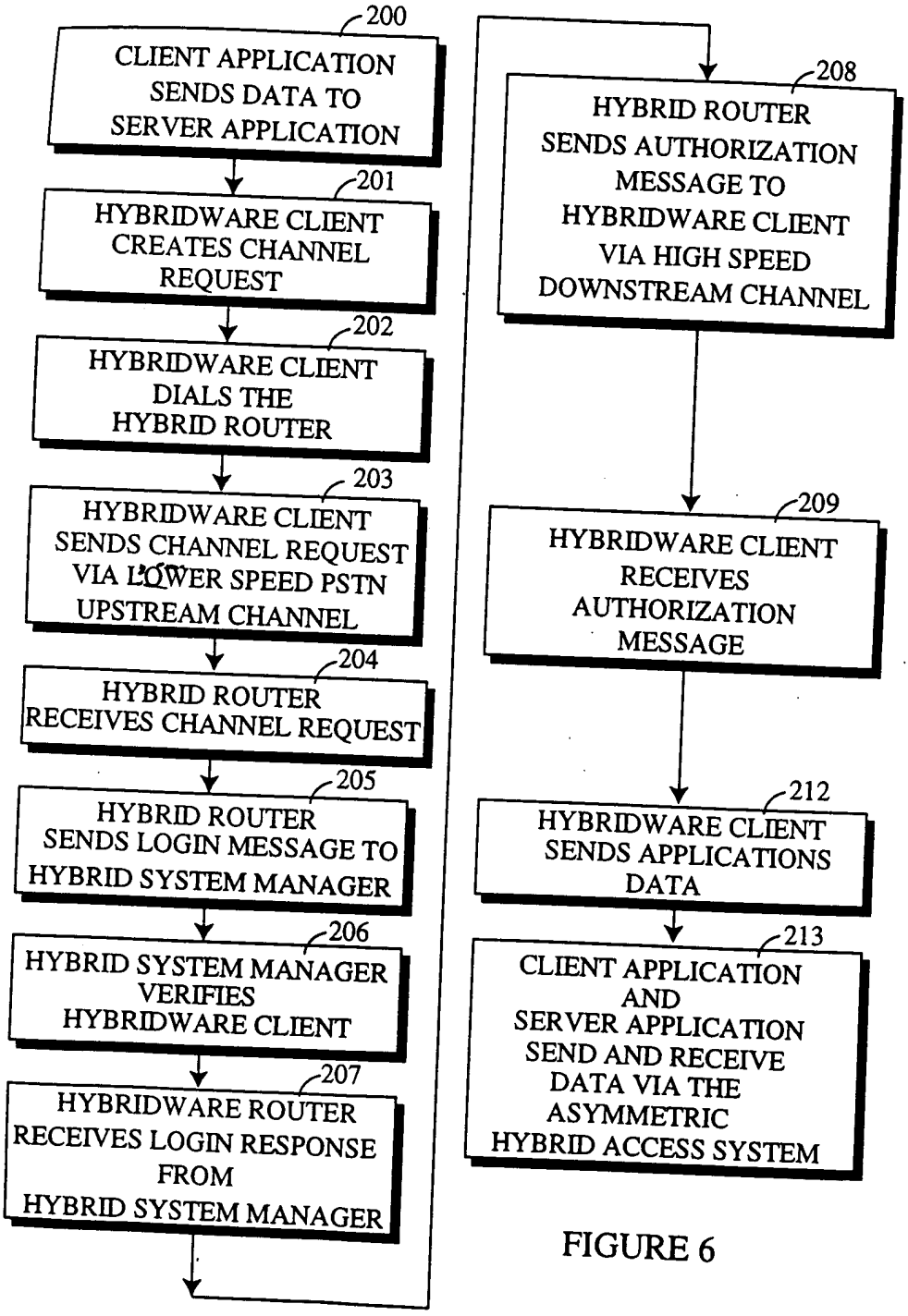
200
CLIENT APPLICATION SENDS DATA TO SERVER APPLICATION
201
HYBRIDWARE CLIENT CREATES CHANNEL REQUEST
202
HYBRIDWARE CLIENT DIALS THE HYBRID ROUTER
203
HYBRIDWARE CLIENT SENDS CHANNEL REQUEST VIA LOWER SPEED PSTN UPSTREAM CHANNEL
204
HYBRID ROUTER RECEIVES CHANNEL REQUEST
205
HYBRID ROUTER SENDS LOGIN MESSAGE TO HYBRID SYSTEM MANAGER
206
HYBRID SYSTEM MANAGER VERIFIES HYBRIDWARE CLIENT
207
HYBRIDWARE ROUTER RECEIVES LOGIN RESPONSE FROM HYBRID SYSTEM MANAGER
208
HYBRID ROUTER SENDS AUTHORIZATION MESSAGE TO HYBRIDWARE CLIENT VIA HIGH SPEED DOWNSTREAM CHANNEL
209
HYBRIDWARE CLIENT RECEIVES AUTHORIZATION MESSAGE
212
HYBRIDWARE CLIENT SENDS APPLICATIONS DATA
213
CLIENT APPLICATION AND SERVER APPLICATION SEND AND RECEIVE DATA VIA THE ASYMMETRIC HYBRID ACCESS SYSTEM

FIGURE 6

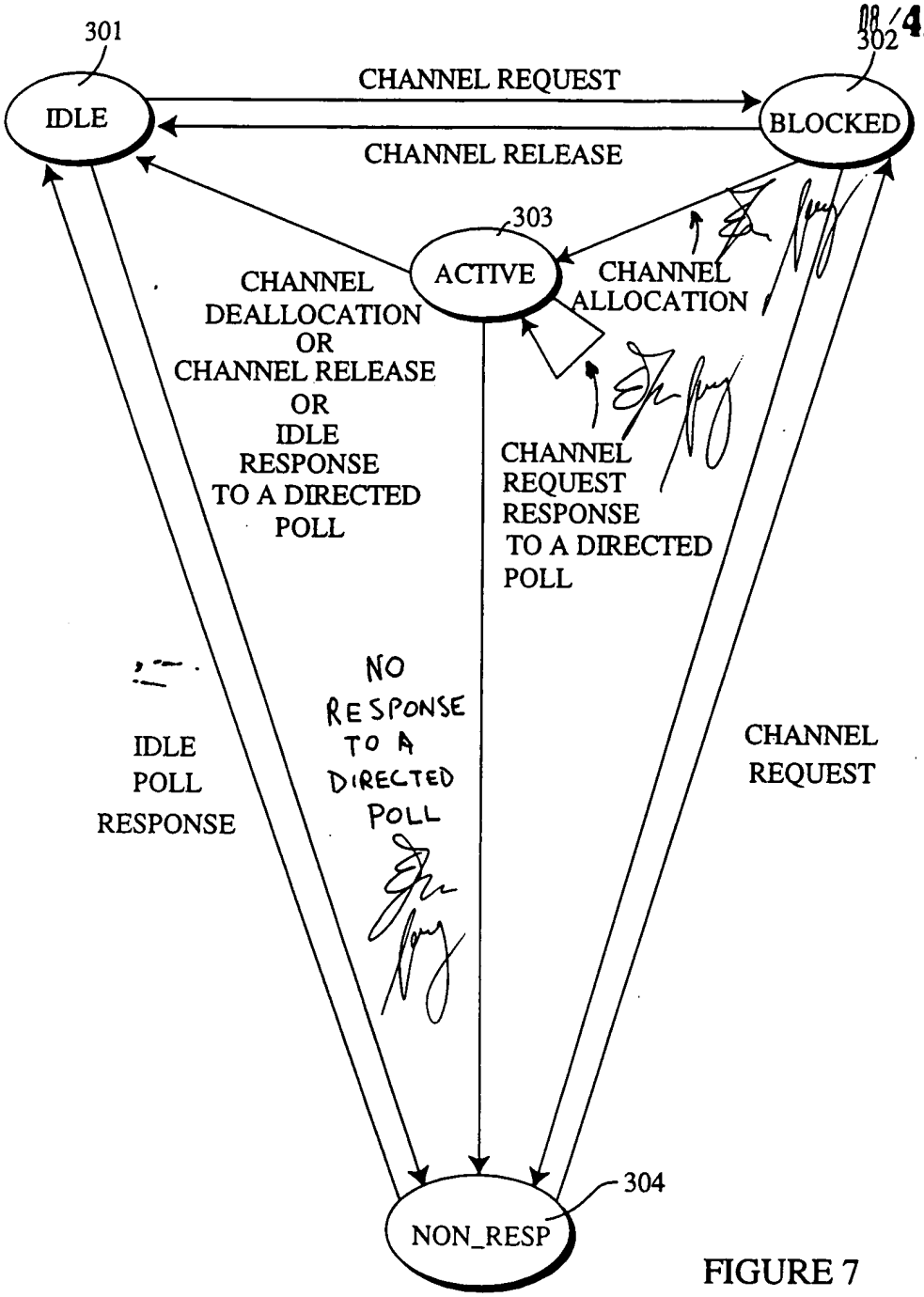
301
IDLE
CHANNEL REQUEST
CHANNEL RELEASE
302
BLOCKED
303
ACTIVE
CHANNEL ALLOCATION
CHANNEL DEALLOCATION OR CHANNEL RELEASE OR IDLE RESPONSE TO A DIRECTED POLL
CHANNEL REQUEST RESPONSE TO A DIRECTED POLL
IDLE POLL RESPONSE
NO RESPONSE TO A DIRECTED POLL
CHANNEL REQUEST
304
NON_RESP

FIGURE 7

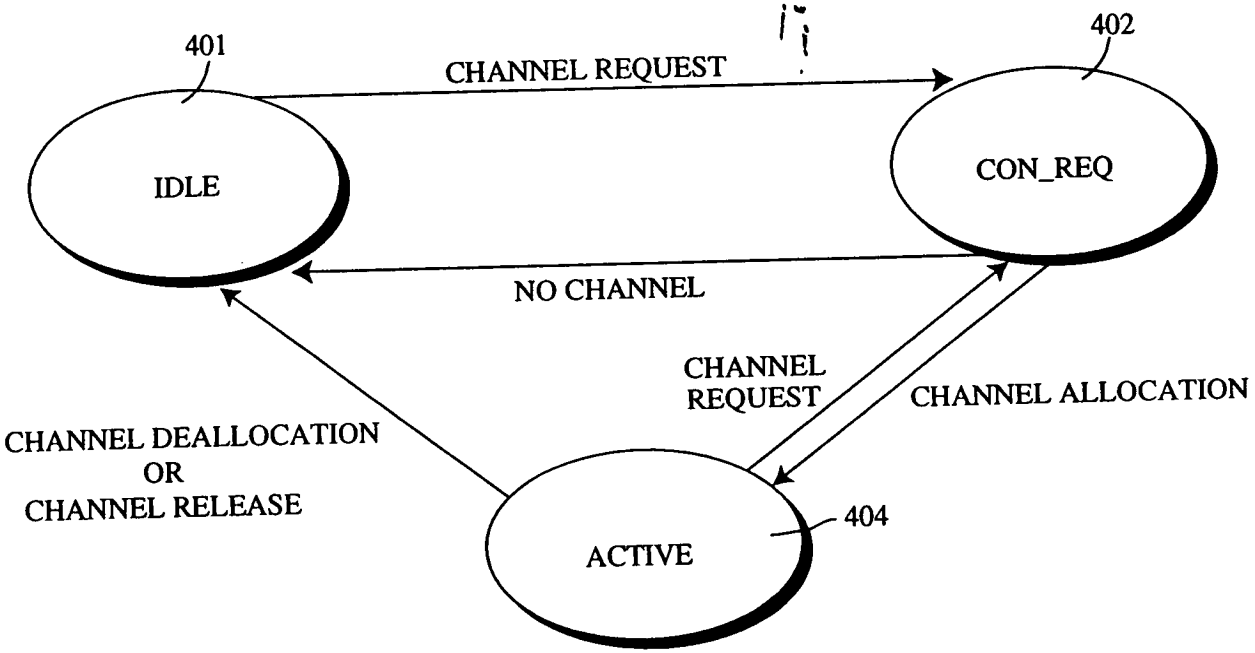

FIGURE 8

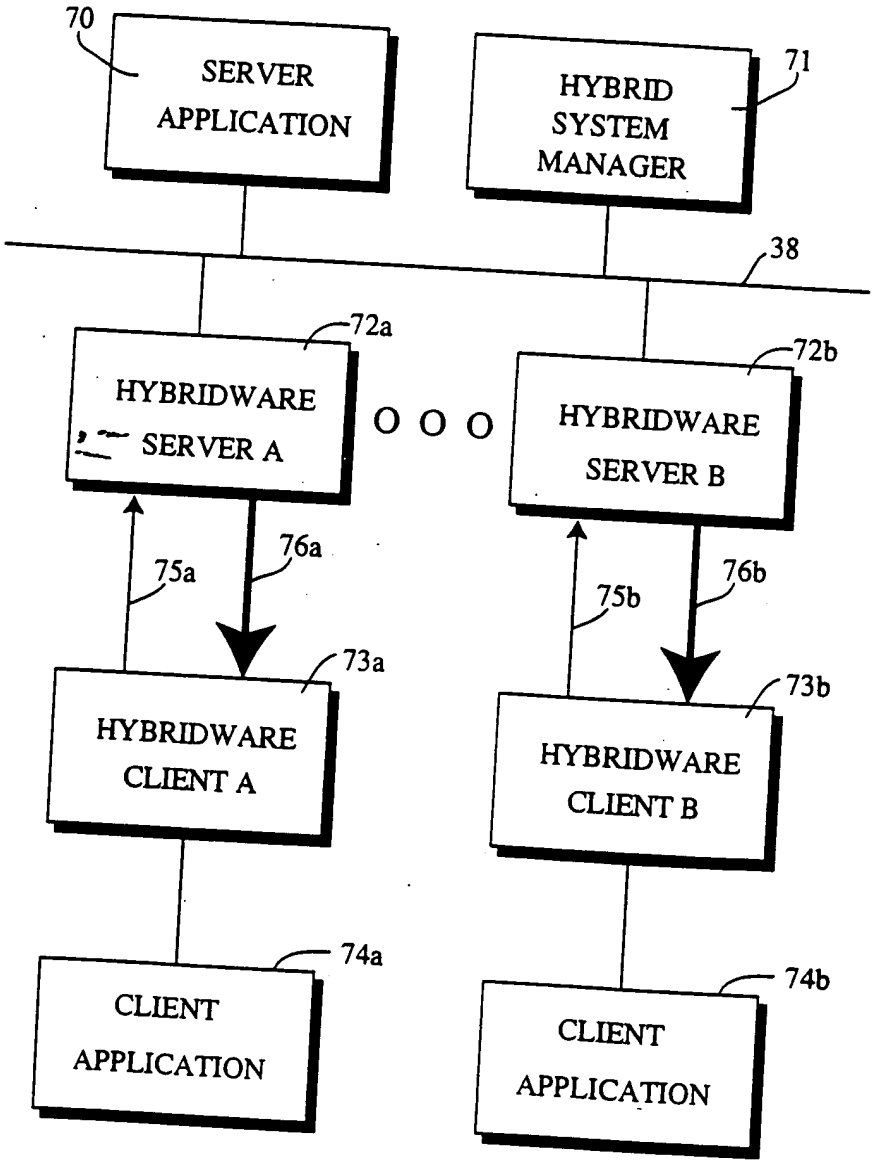
70
SERVER APPLICATION
HYBRID SYSTEM MANAGER
71
38
72a
HYBRIDWARE SERVER A
O O O
72b
HYBRIDWARE SERVER B
75a
76a
75b
76b
73a
HYBRIDWARE CLIENT A
73b
HYBRIDWARE CLIENT B
74a
CLIENT APPLICATION
74b
CLIENT APPLICATION

FIGURE 9

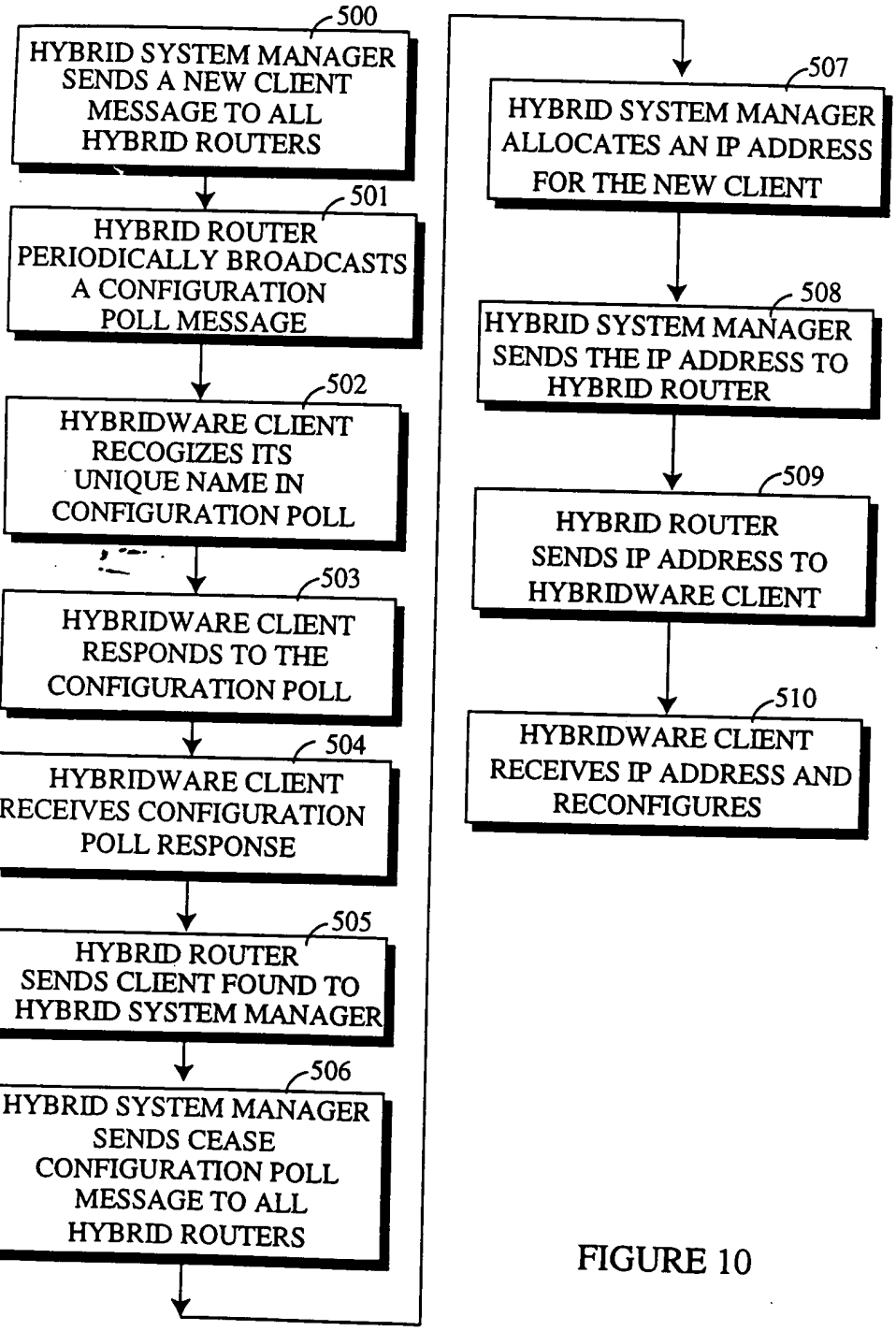
500
HYBRID SYSTEM MANAGER SENDS A NEW CLIENT MESSAGE TO ALL HYBRID ROUTERS
501
HYBRID ROUTER PERIODICALLY BROADCASTS A CONFIGURATION POLL MESSAGE
502
HYBRIDWARE CLIENT RECOGIZES ITS UNIQUE NAME IN CONFIGURATION POLL
503
HYBRIDWARE CLIENT RESPONDS TO THE CONFIGURATION POLL
504
HYBRIDWARE CLIENT RECEIVES CONFIGURATION POLL RESPONSE
505
HYBRID ROUTER SENDS CLIENT FOUND TO HYBRID SYSTEM MANAGER
506
HYBRID SYSTEM MANAGER SENDS CEASE CONFIGURATION POLL MESSAGE TO ALL HYBRID ROUTERS
507
HYBRID SYSTEM MANAGER ALLOCATES AN IP ADDRESS FOR THE NEW CLIENT
508
HYBRID SYSTEM MANAGER SENDS THE IP ADDRESS TO HYBRID ROUTER
509
HYBRID ROUTER SENDS IP ADDRESS TO HYBRIDWARE CLIENT
510
HYBRIDWARE CLIENT RECEIVES IP ADDRESS AND RECONFIGURES

FIGURE 10

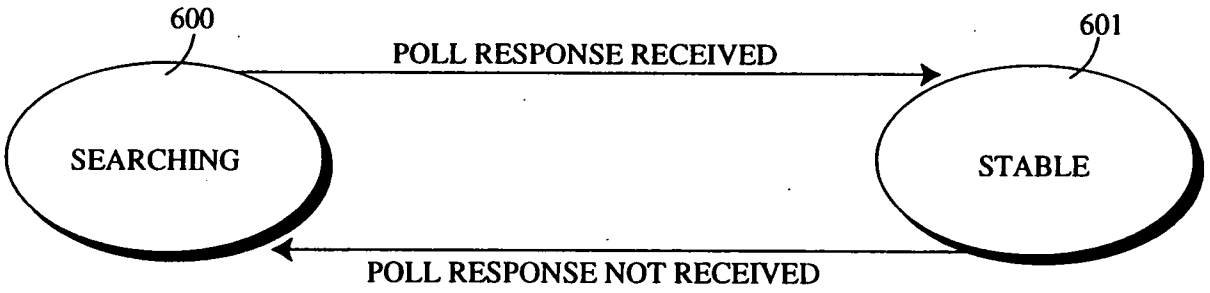

FIGURE 11

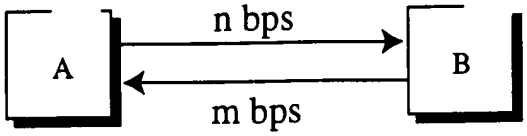

FIGURE 12a
PRIOR ART

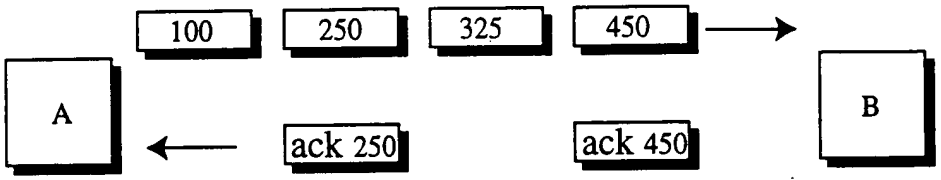

FIGURE 12b
PRIOR ART

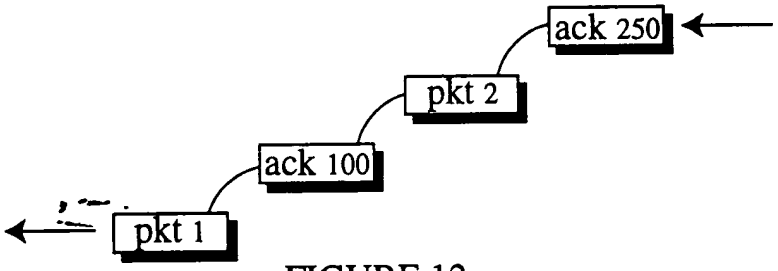

FIGURE 12c

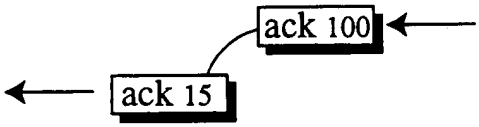

FIGURE 12d

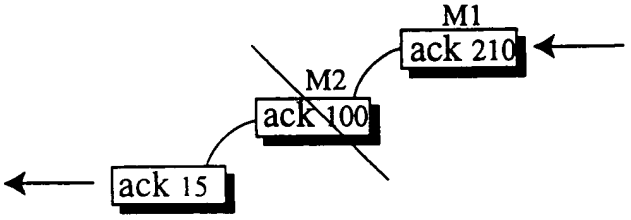

FIGURE 12e

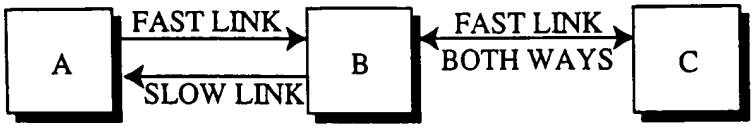

FIGURE 12f

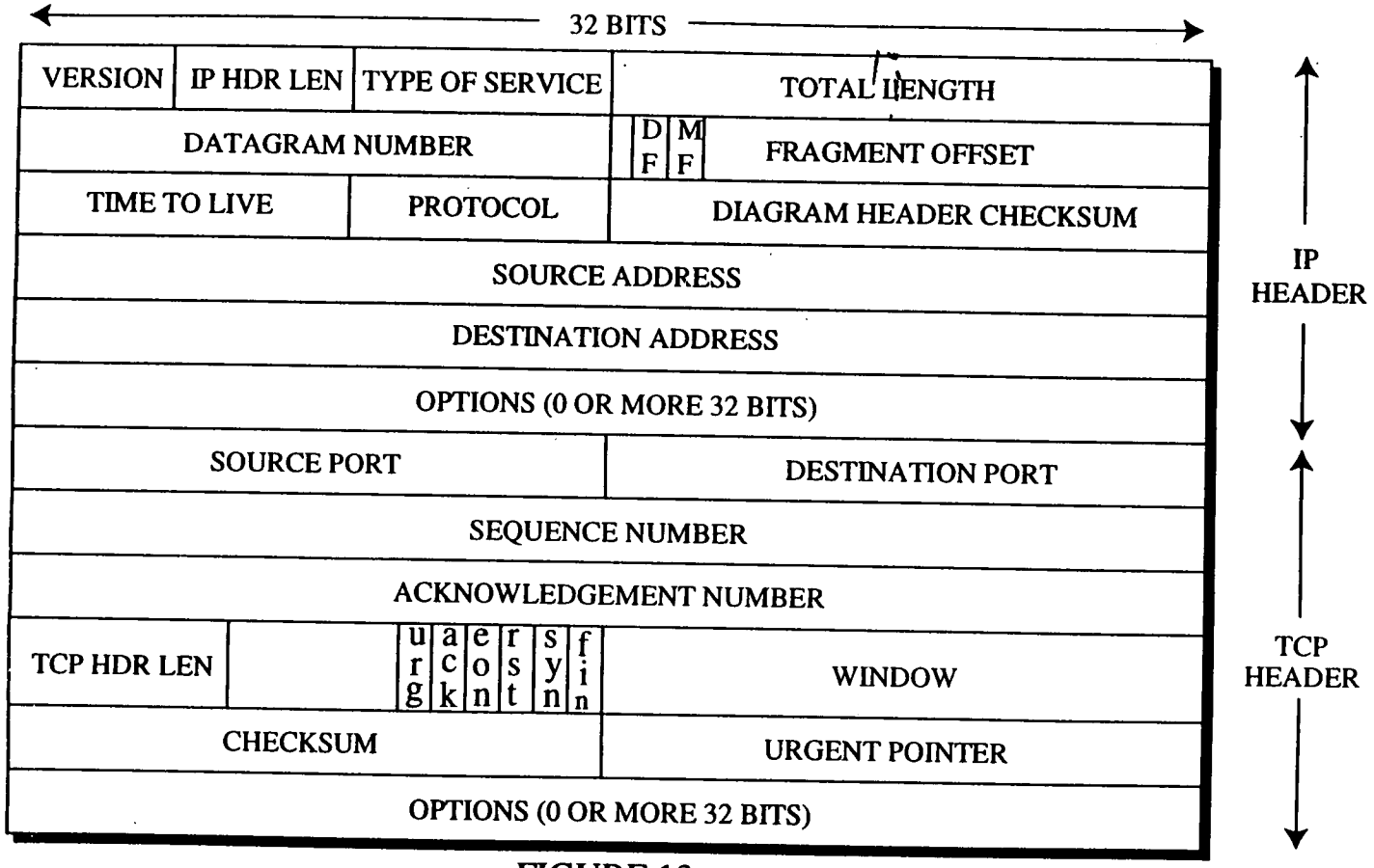

FIGURE 13

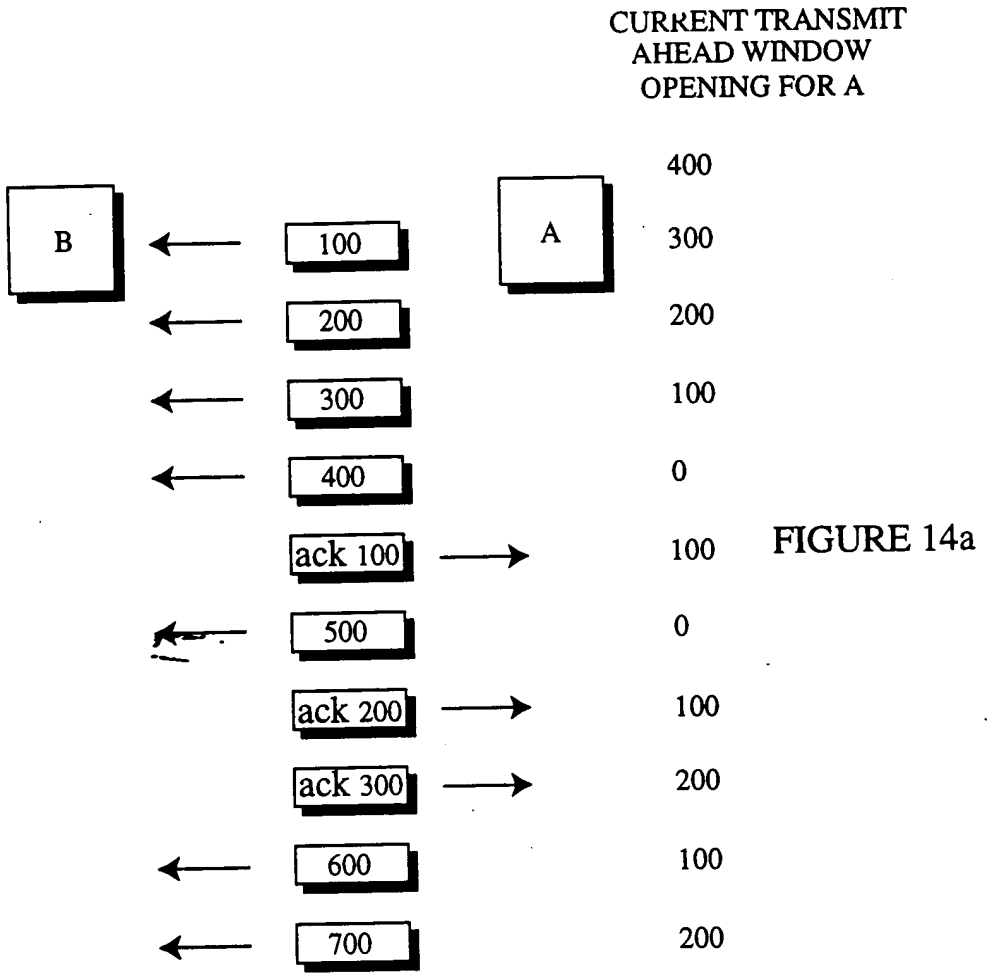

FIGURE 14a

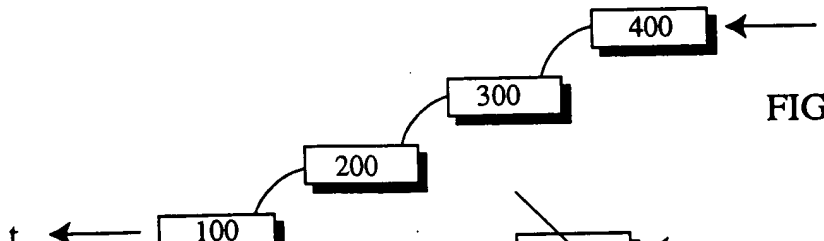

FIGURE 14b

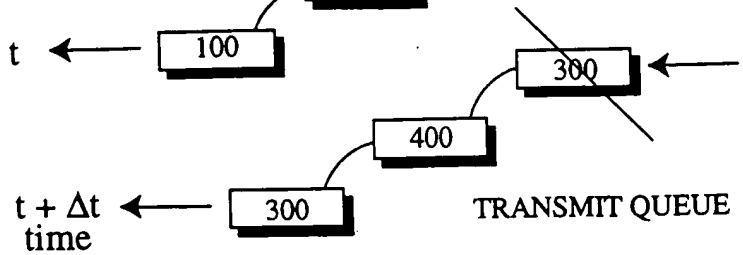

FIGURE 14c

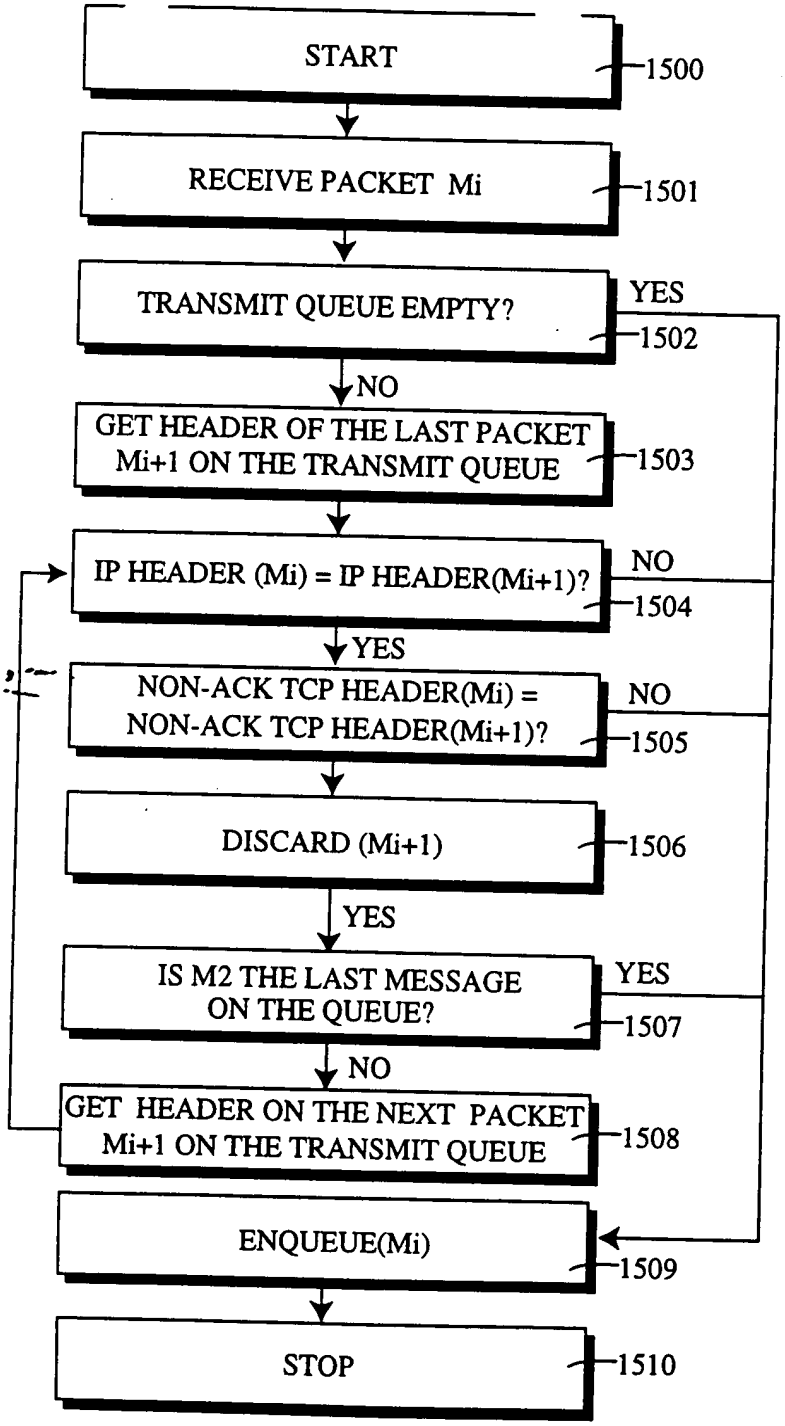
START
1500
RECEIVE PACKET Mi
1501
TRANSMIT QUEUE EMPTY?
YES
1502
NO
GET HEADER OF THE LAST PACKET Mi+1 ON THE TRANSMIT QUEUE
1503
IP HEADER (Mi) = IP HEADER(Mi+1)?
NO
1504
YES
NON-ACK TCP HEADER(Mi) = NON-ACK TCP HEADER(Mi+1)?
NO
1505
DISCARD (Mi+1)
1506
YES
IS M2 THE LAST MESSAGE ON THE QUEUE?
YES
1507
NO
GET HEADER ON THE NEXT PACKET Mi+1 ON THE TRANSMIT QUEUE
1508
ENQUEUE(Mi)
1509
STOP
1510

FIGURE 15

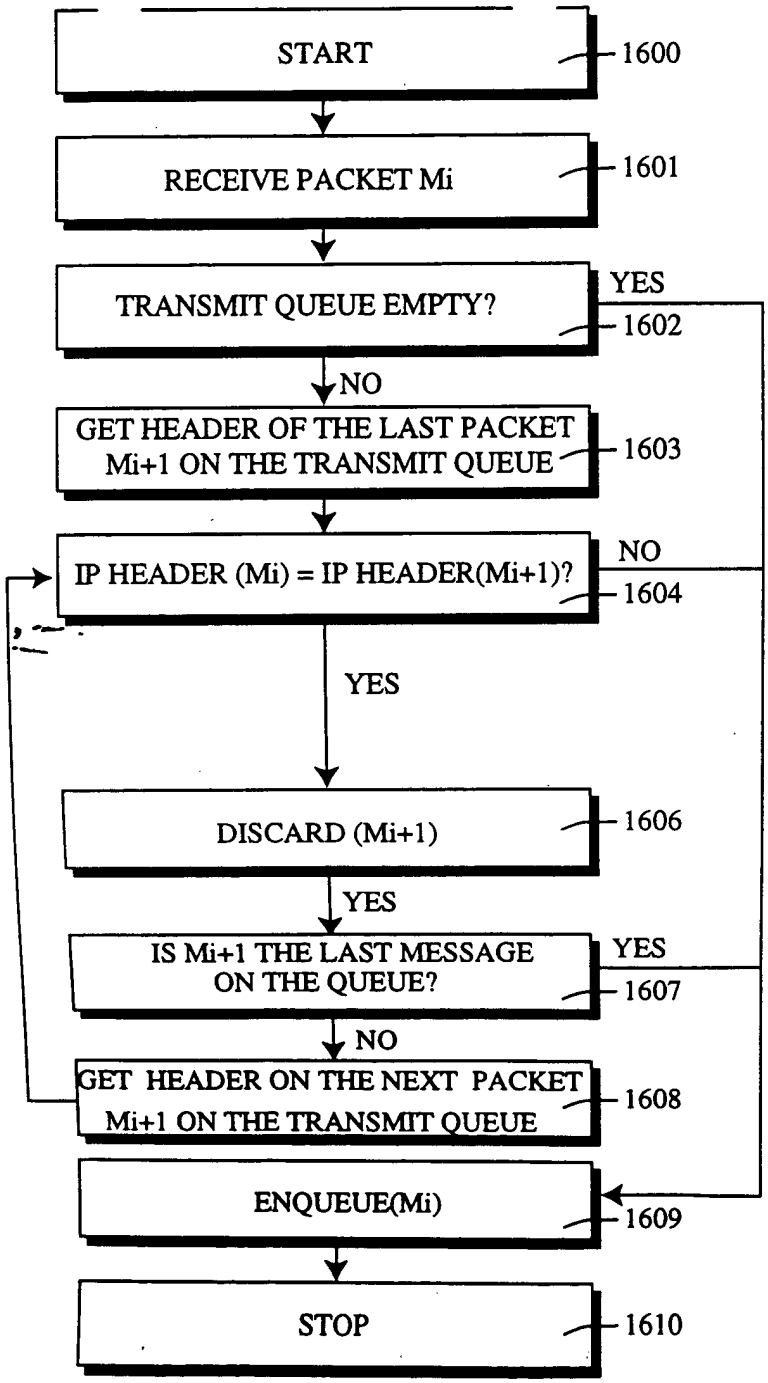
START
1600
RECEIVE PACKET Mi
1601
TRANSMIT QUEUE EMPTY?
YES
1602
NO
GET HEADER OF THE LAST PACKET Mi+1 ON THE TRANSMIT QUEUE
1603
IP HEADER (Mi) = IP HEADER(Mi+1)?
NO
1604
YES
DISCARD (Mi+1)
1606
YES
IS Mi+1 THE LAST MESSAGE ON THE QUEUE?
YES
1607
NO
GET HEADER ON THE NEXT PACKET Mi+1 ON THE TRANSMIT QUEUE
1608
ENQUEUE(Mi)
1609
STOP
1610

FIGURE 16

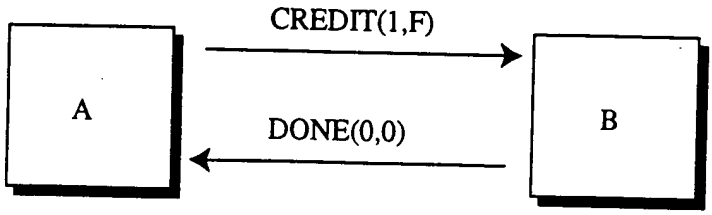

FIGURE 17

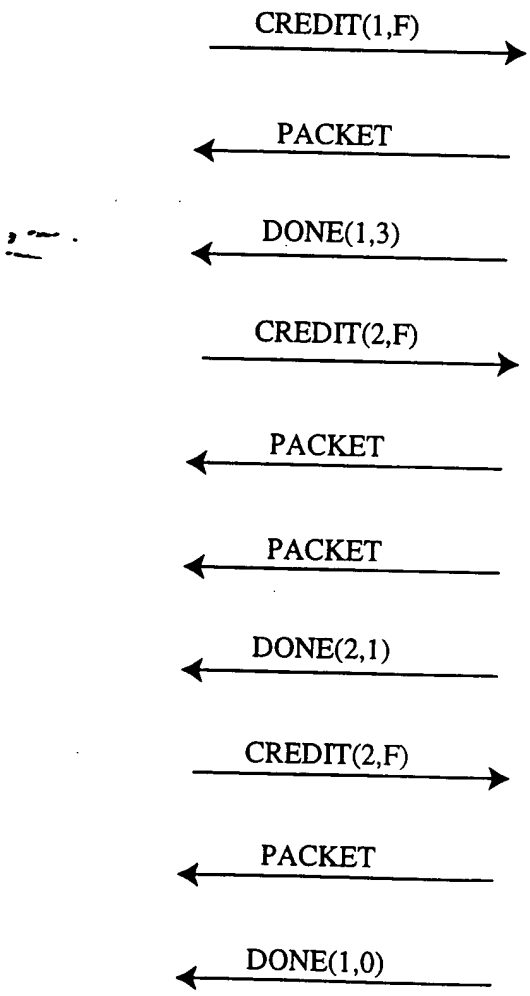

FIGURE 18

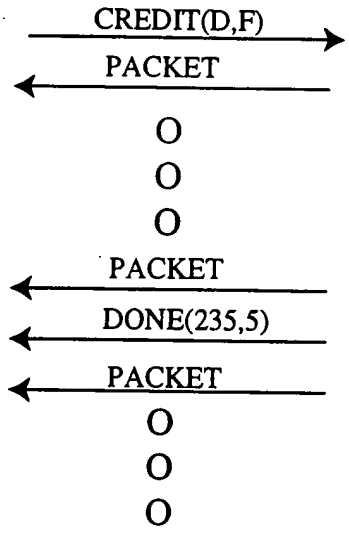

FIGURE 19

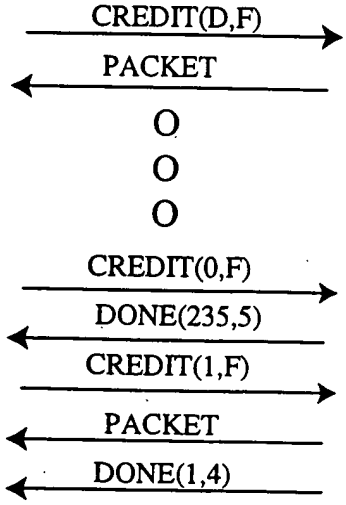

FIGURE 20

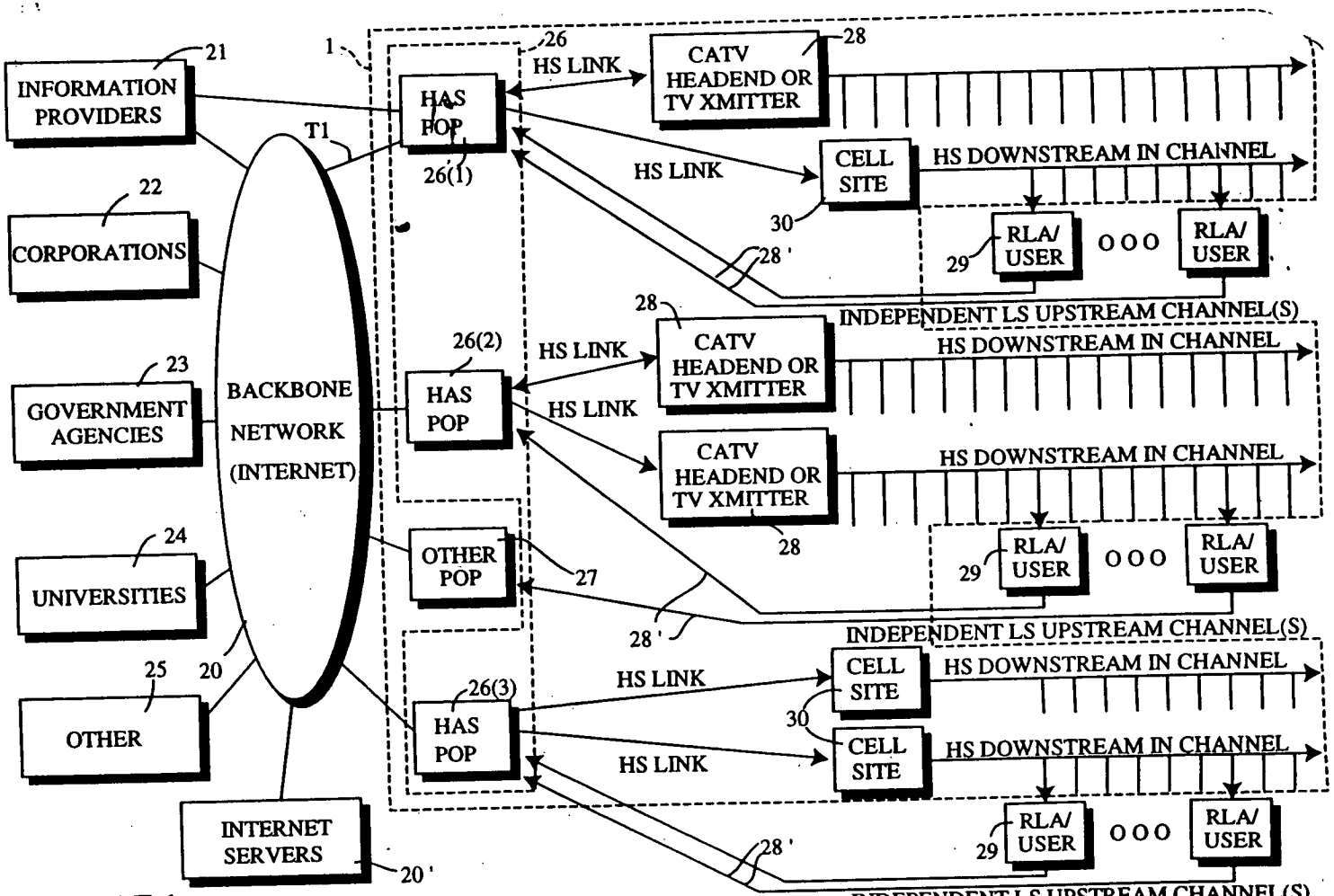

FIGURE 1

H000069

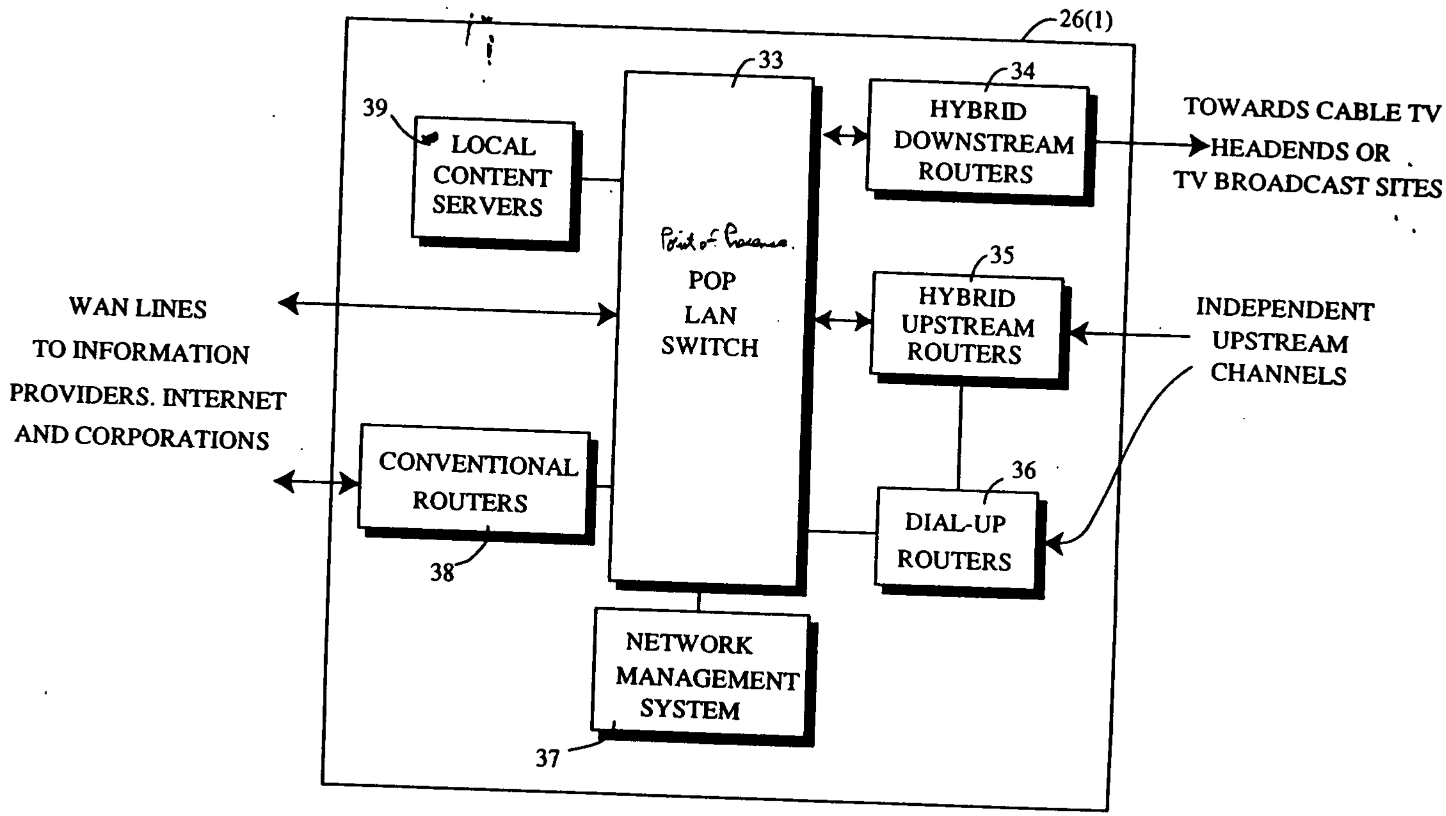

FIGURE 2a

H000070

08/426920

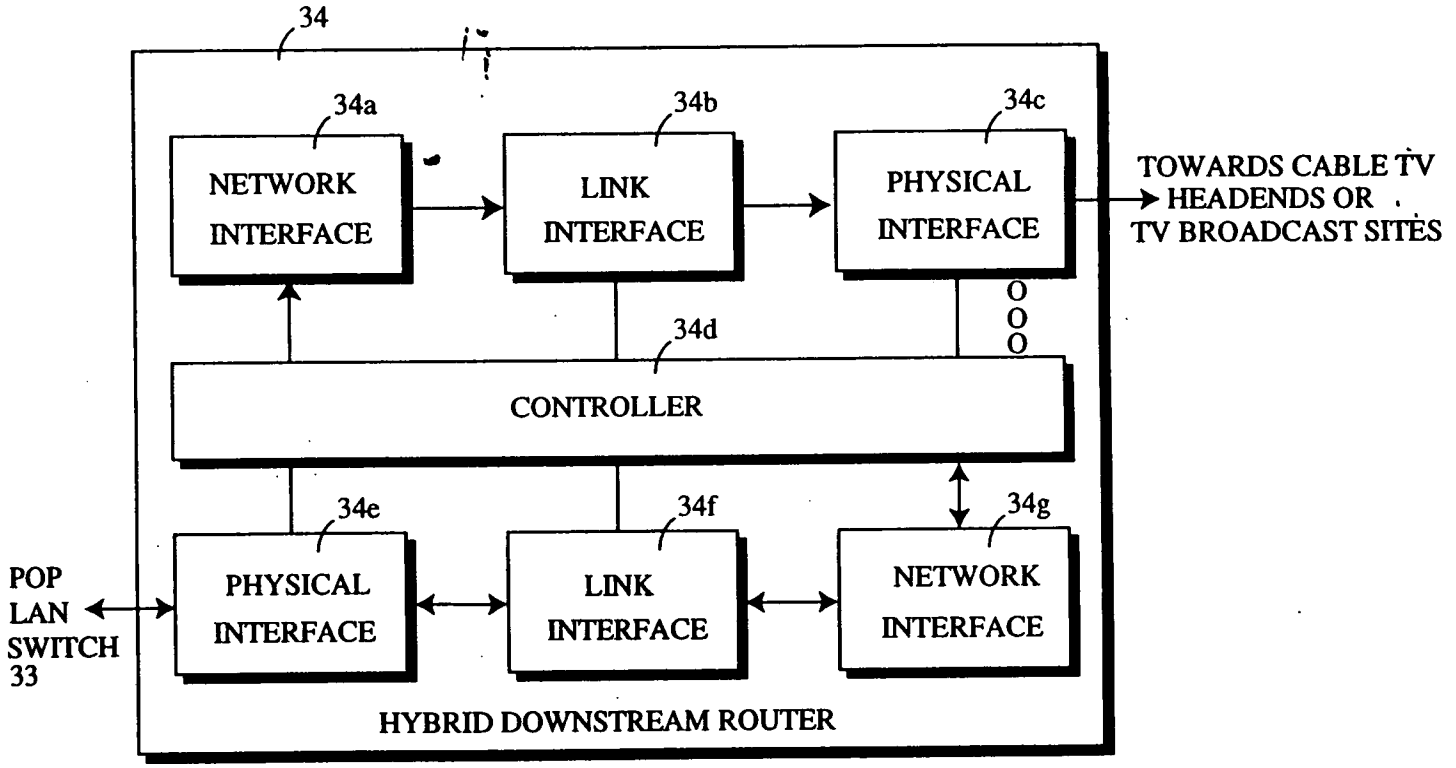

FIGURE 2b

H000071

08/426920

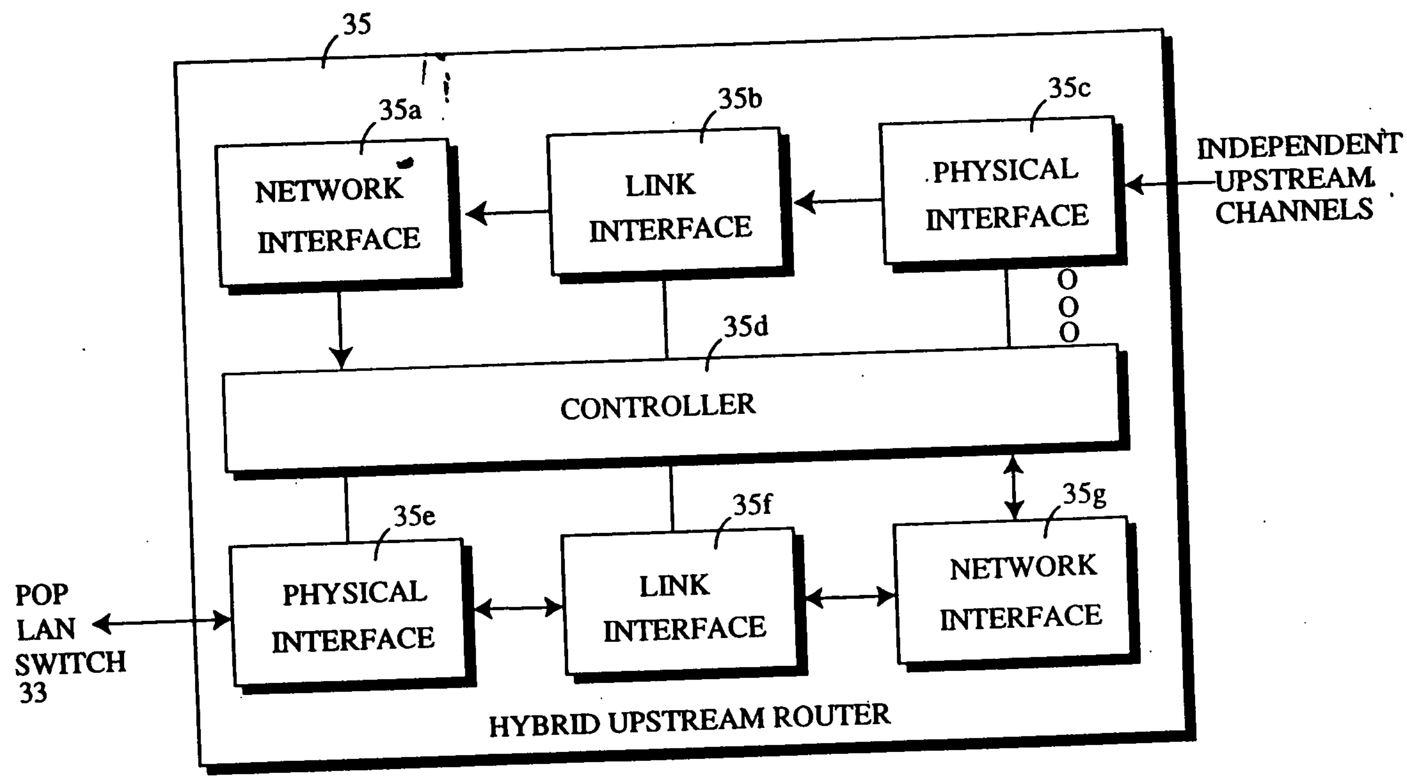

FIGURE 2c

H000072

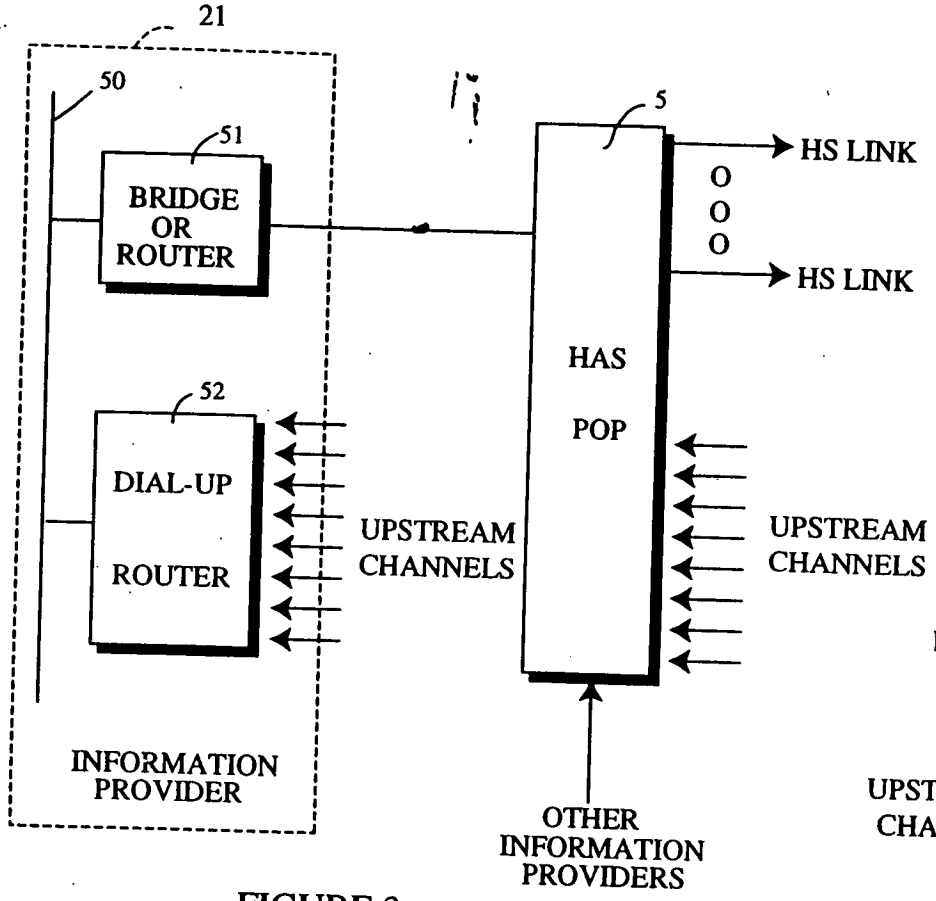

FIGURE 3a

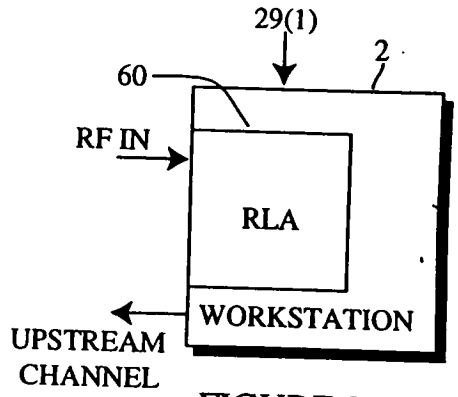

FIGURE 3b

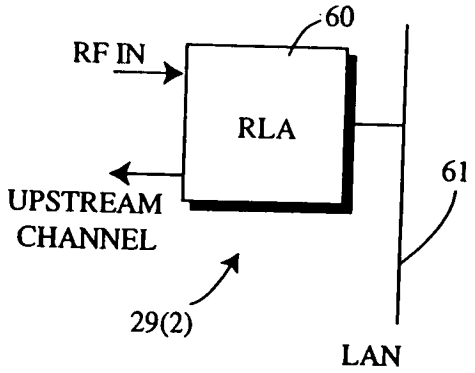

FIGURE 3c

H000073

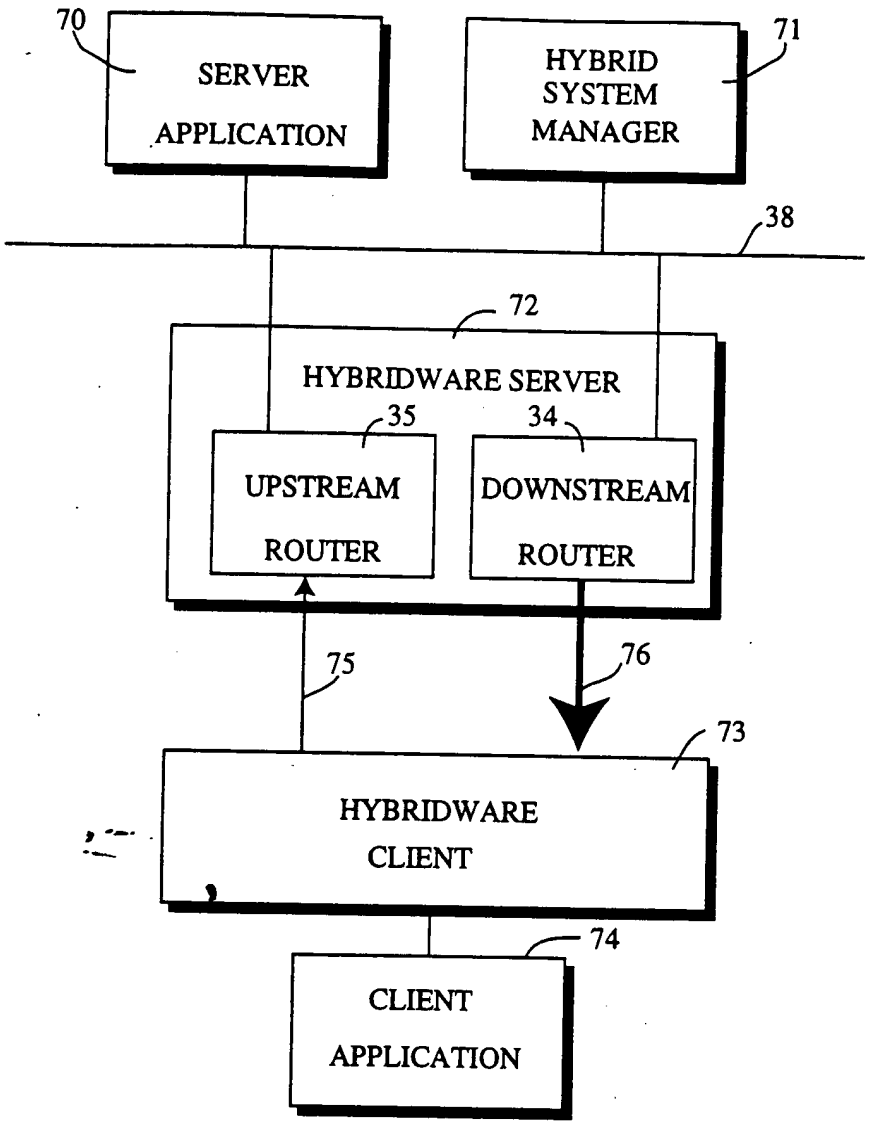
70
SERVER APPLICATION
71
HYBRID SYSTEM MANAGER
38
72
HYBRIDWARE SERVER
35
34
UPSTREAM ROUTER
DOWNSTREAM ROUTER
75
76
73
HYBRIDWARE CLIENT
74
CLIENT APPLICATION

FIGURE 4

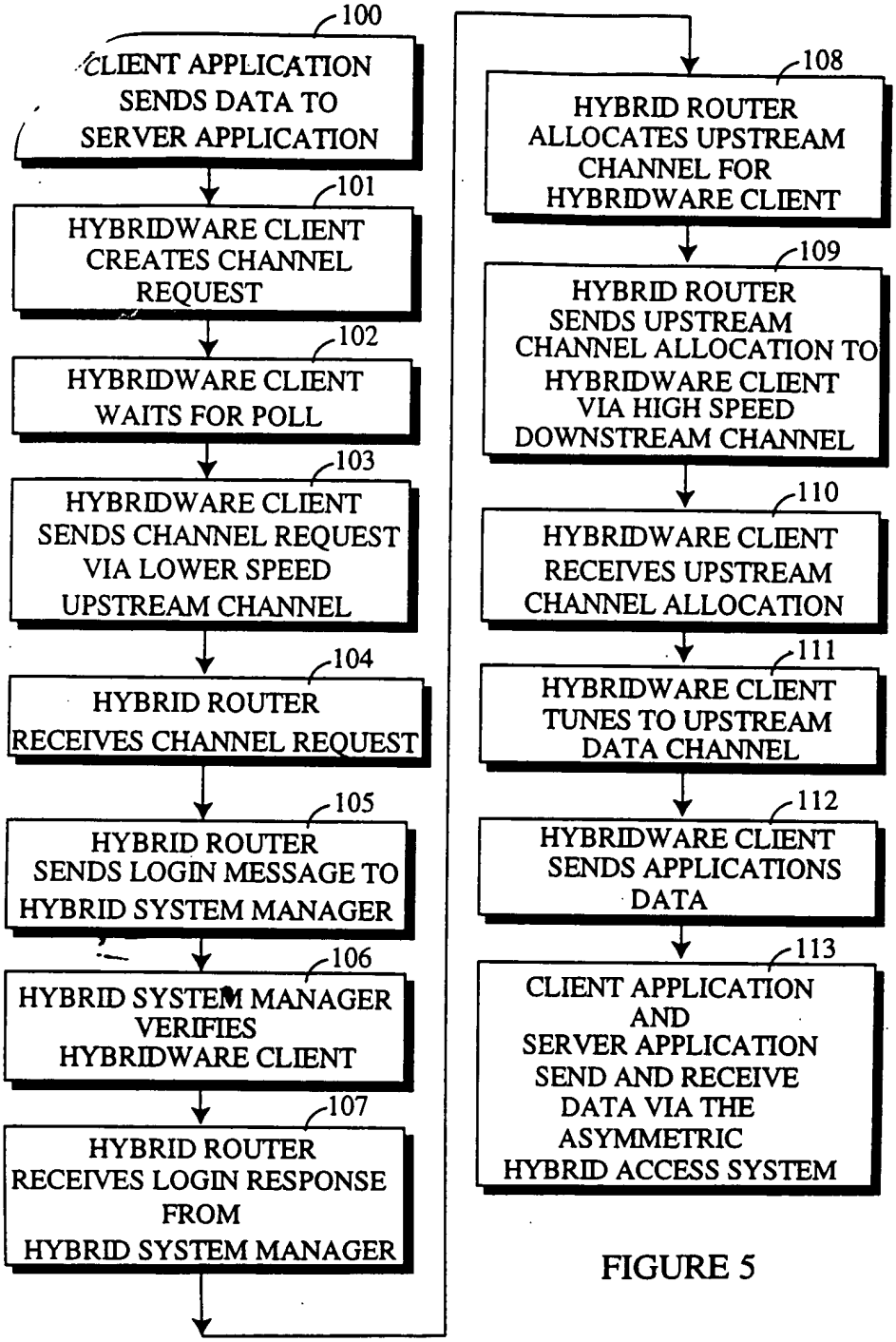
100
CLIENT APPLICATION SENDS DATA TO SERVER APPLICATION
101
HYBRIDWARE CLIENT CREATES CHANNEL REQUEST
102
HYBRIDWARE CLIENT WAITS FOR POLL
103
HYBRIDWARE CLIENT SENDS CHANNEL REQUEST VIA LOWER SPEED UPSTREAM CHANNEL
104
HYBRID ROUTER RECEIVES CHANNEL REQUEST
105
HYBRID ROUTER SENDS LOGIN MESSAGE TO HYBRID SYSTEM MANAGER
106
HYBRID SYSTEM MANAGER VERIFIES HYBRIDWARE CLIENT
107
HYBRID ROUTER RECEIVES LOGIN RESPONSE FROM HYBRID SYSTEM MANAGER
108
HYBRID ROUTER ALLOCATES UPSTREAM CHANNEL FOR HYBRIDWARE CLIENT
109
HYBRID ROUTER SENDS UPSTREAM CHANNEL ALLOCATION TO HYBRIDWARE CLIENT VIA HIGH SPEED DOWNSTREAM CHANNEL
110
HYBRIDWARE CLIENT RECEIVES UPSTREAM CHANNEL ALLOCATION
111
HYBRIDWARE CLIENT TUNES TO UPSTREAM DATA CHANNEL
112
HYBRIDWARE CLIENT SENDS APPLICATIONS DATA
113
CLIENT APPLICATION AND SERVER APPLICATION SEND AND RECEIVE DATA VIA THE ASYMMETRIC HYBRID ACCESS SYSTEM

FIGURE 5

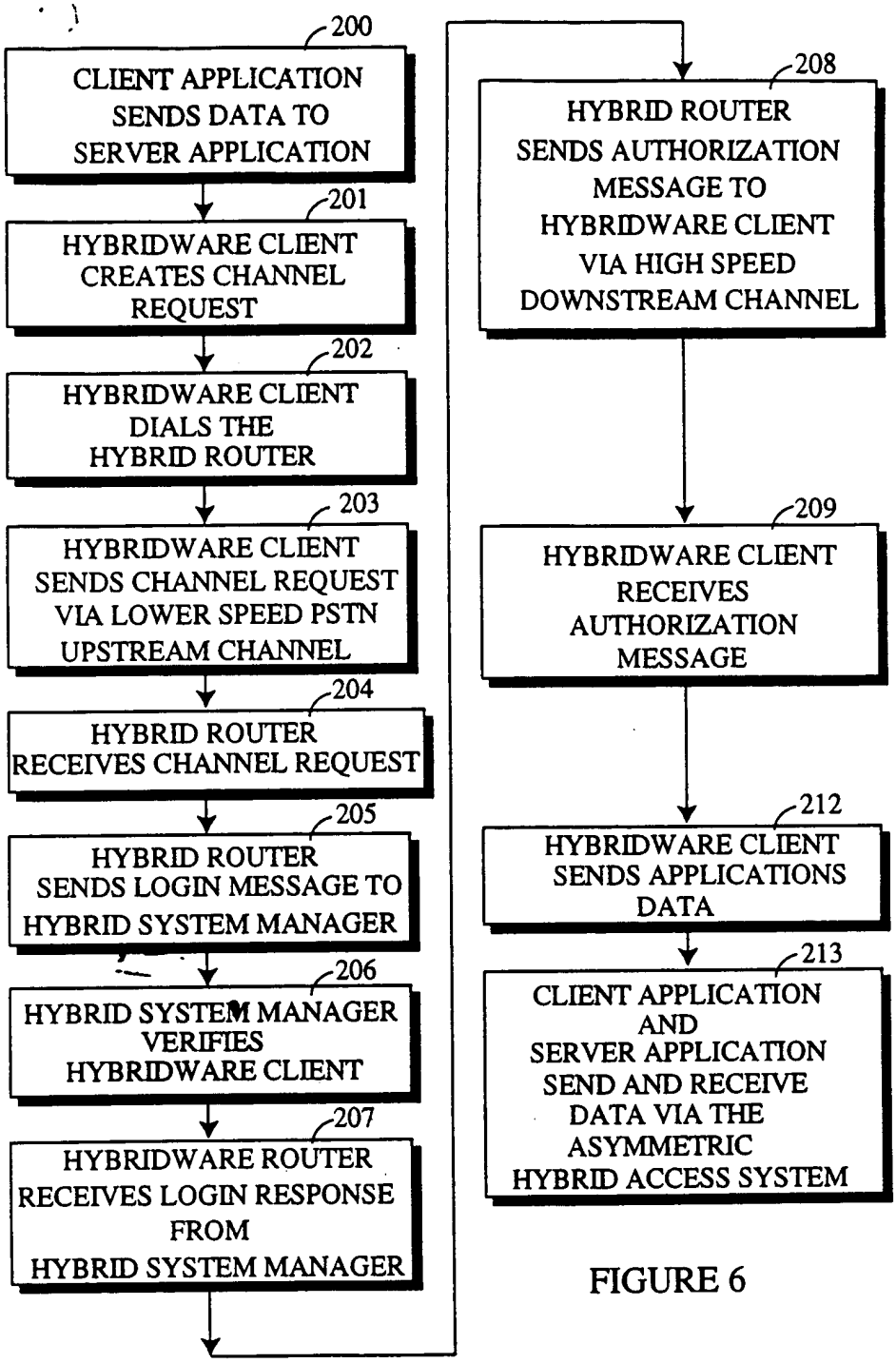
200
CLIENT APPLICATION SENDS DATA TO SERVER APPLICATION
201
HYBRIDWARE CLIENT CREATES CHANNEL REQUEST
202
HYBRIDWARE CLIENT DIALS THE HYBRID ROUTER
203
HYBRIDWARE CLIENT SENDS CHANNEL REQUEST VIA LOWER SPEED PSTN UPSTREAM CHANNEL
204
HYBRID ROUTER RECEIVES CHANNEL REQUEST
205
HYBRID ROUTER SENDS LOGIN MESSAGE TO HYBRID SYSTEM MANAGER
206
HYBRID SYSTEM MANAGER VERIFIES HYBRIDWARE CLIENT
207
HYBRIDWARE ROUTER RECEIVES LOGIN RESPONSE FROM HYBRID SYSTEM MANAGER
208
HYBRID ROUTER SENDS AUTHORIZATION MESSAGE TO HYBRIDWARE CLIENT VIA HIGH SPEED DOWNSTREAM CHANNEL
209
HYBRIDWARE CLIENT RECEIVES AUTHORIZATION MESSAGE
212
HYBRIDWARE CLIENT SENDS APPLICATIONS DATA
213
CLIENT APPLICATION AND SERVER APPLICATION SEND AND RECEIVE DATA VIA THE ASYMMETRIC HYBRID ACCESS SYSTEM

FIGURE 6

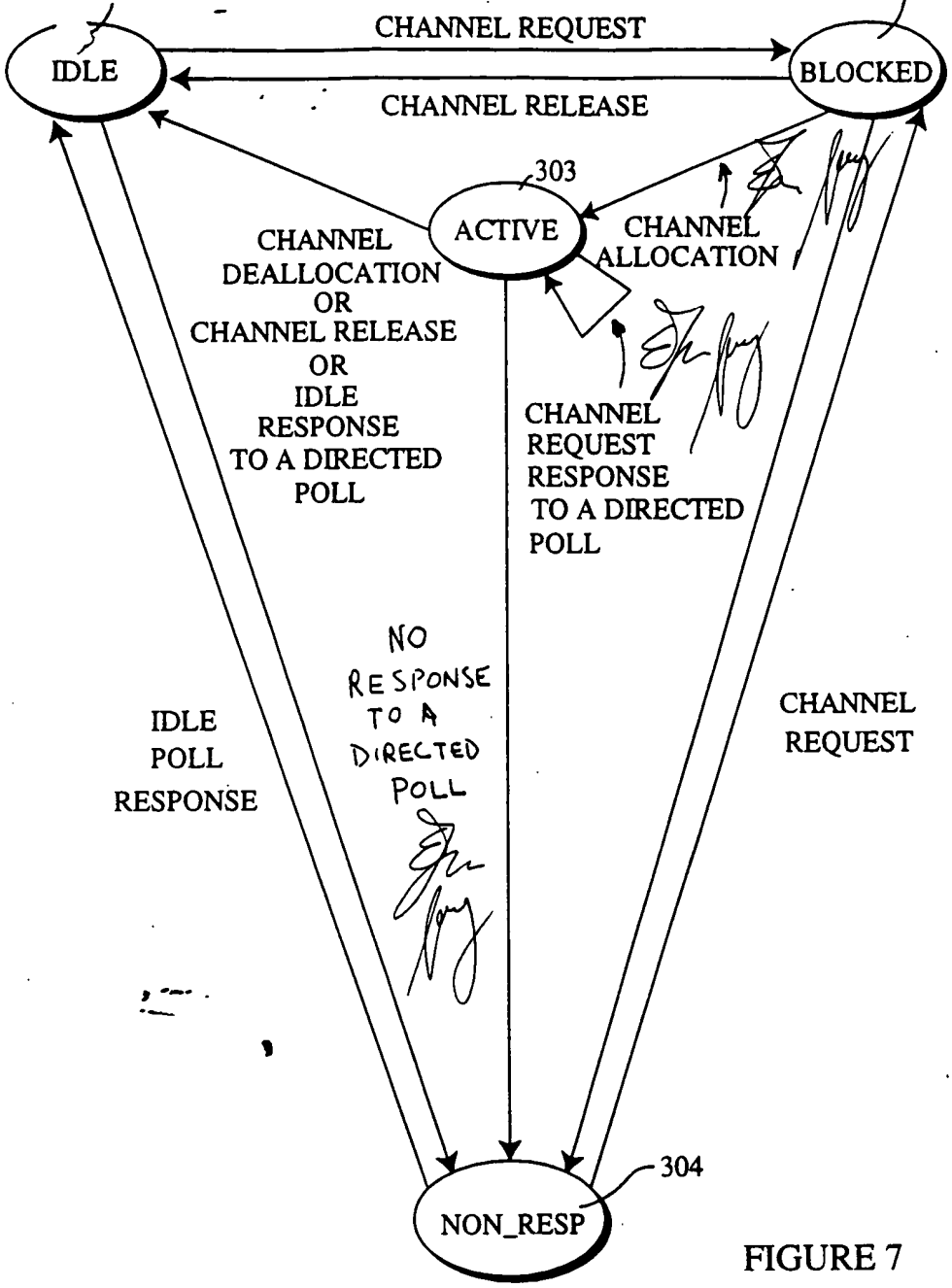

FIGURE 7

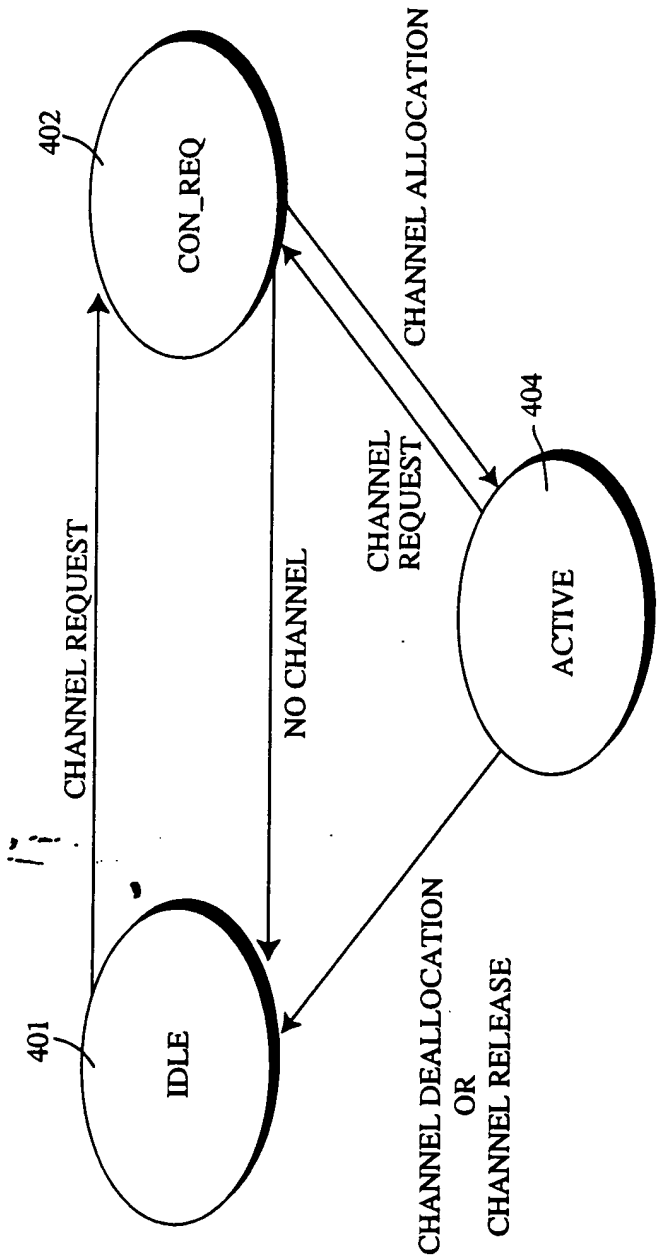

FIGURE 8

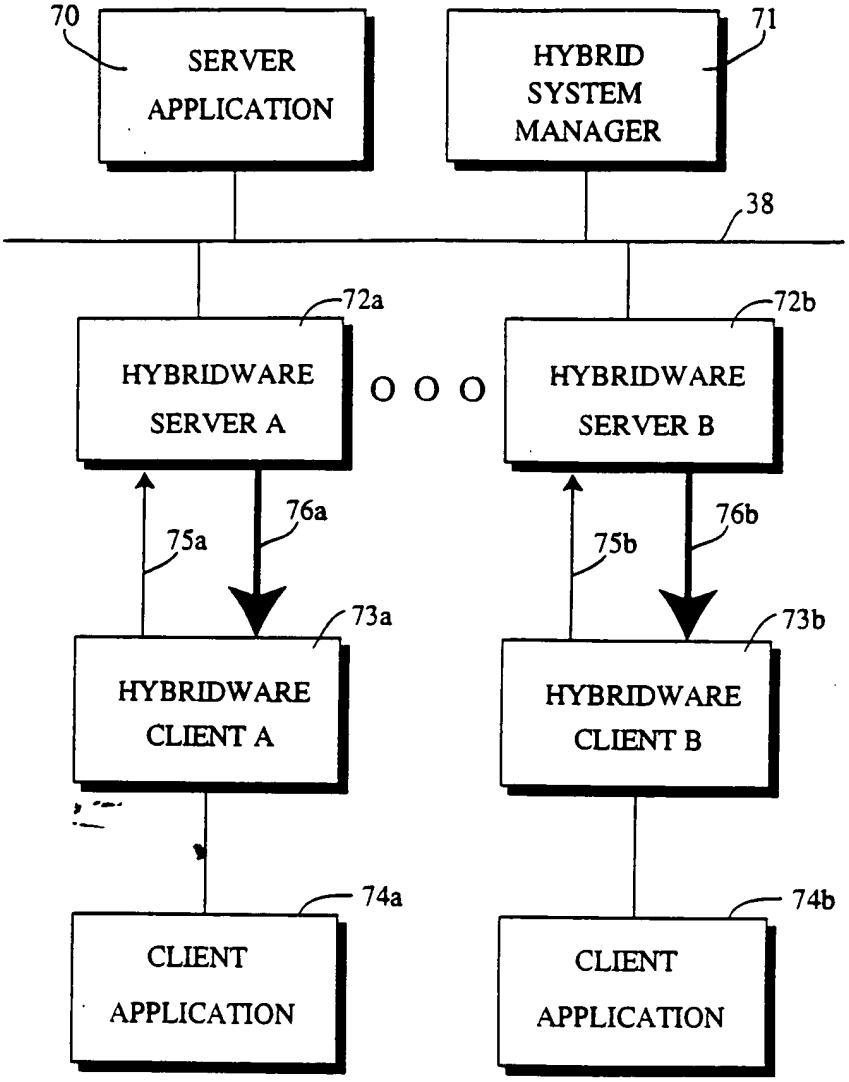
70
SERVER APPLICATION
71
HYBRID SYSTEM MANAGER
38
72a
HYBRIDWARE SERVER A
O O O
72b
HYBRIDWARE SERVER B
75a
76a
75b
76b
73a
HYBRIDWARE CLIENT A
73b
HYBRIDWARE CLIENT B
74a
CLIENT APPLICATION
74b
CLIENT APPLICATION

FIGURE 9

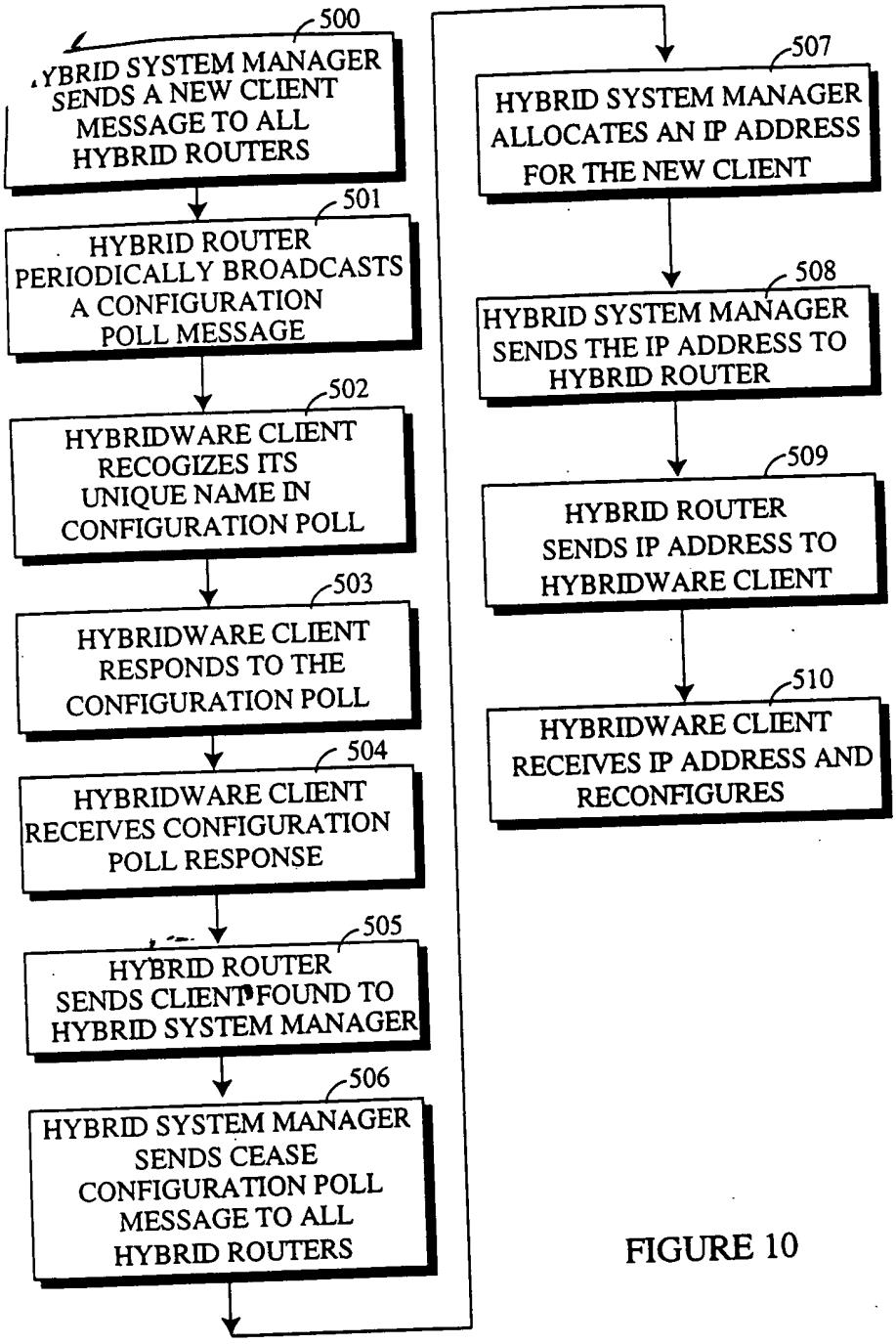
500
HYBRID SYSTEM MANAGER SENDS A NEW CLIENT MESSAGE TO ALL HYBRID ROUTERS
501
HYBRID ROUTER PERIODICALLY BROADCASTS A CONFIGURATION POLL MESSAGE
502
HYBRIDWARE CLIENT RECOGIZES ITS UNIQUE NAME IN CONFIGURATION POLL
503
HYBRIDWARE CLIENT RESPONDS TO THE CONFIGURATION POLL
504
HYBRIDWARE CLIENT RECEIVES CONFIGURATION POLL RESPONSE
505
HYBRID ROUTER SENDS CLIENT FOUND TO HYBRID SYSTEM MANAGER
506
HYBRID SYSTEM MANAGER SENDS CEASE CONFIGURATION POLL MESSAGE TO ALL HYBRID ROUTERS
507
HYBRID SYSTEM MANAGER ALLOCATES AN IP ADDRESS FOR THE NEW CLIENT
508
HYBRID SYSTEM MANAGER SENDS THE IP ADDRESS TO HYBRID ROUTER
509
HYBRID ROUTER SENDS IP ADDRESS TO HYBRIDWARE CLIENT
510
HYBRIDWARE CLIENT RECEIVES IP ADDRESS AND RECONFIGURES

FIGURE 10

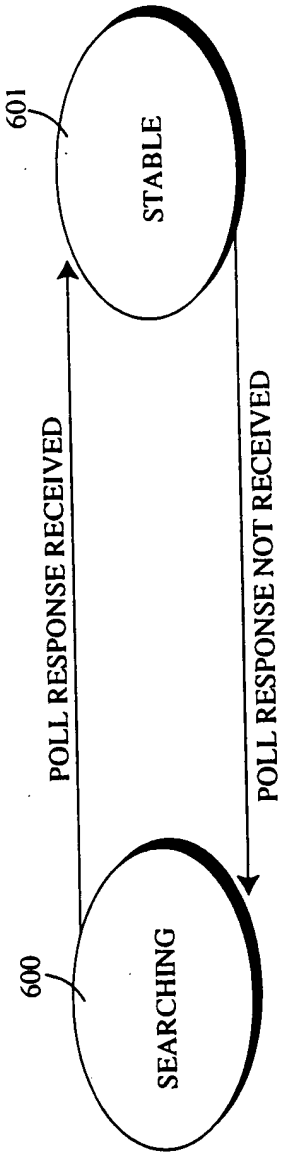

FIGURE 11

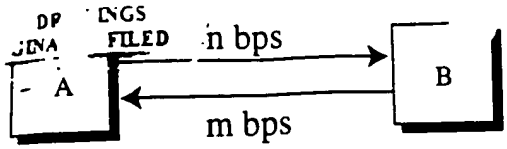

FIGURE 12a
PRIOR ART

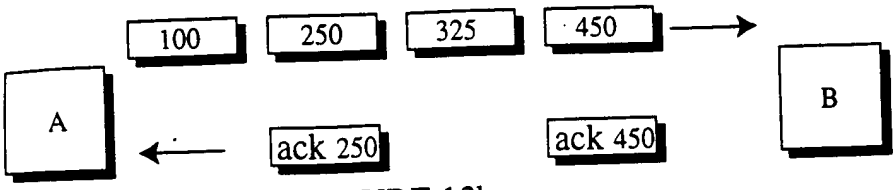

FIGURE 12b
PRIOR ART

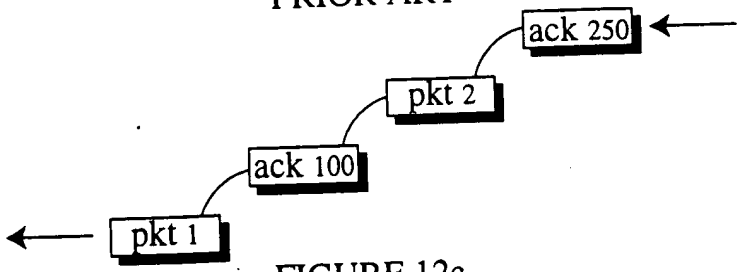

FIGURE 12c

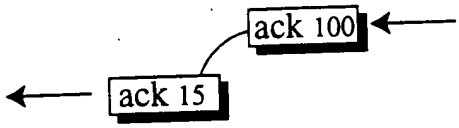

FIGURE 12d

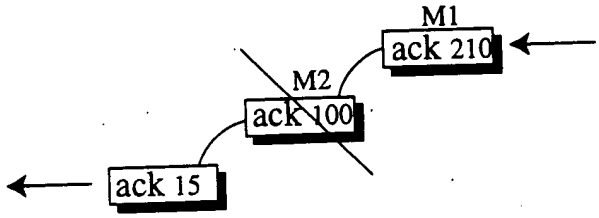

FIGURE 12e

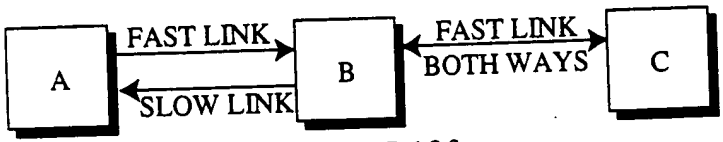

FIGURE 12f

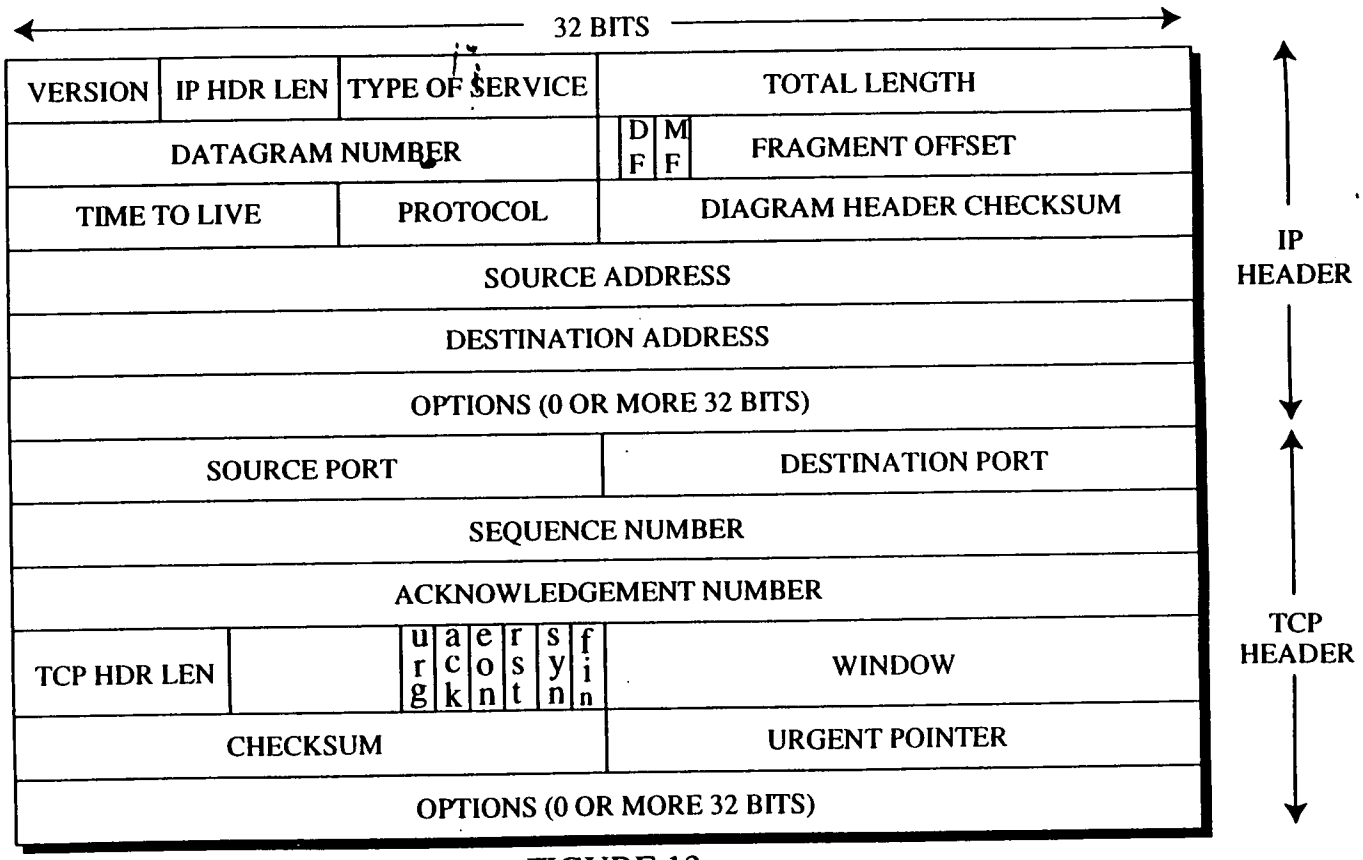

FIGURE 13

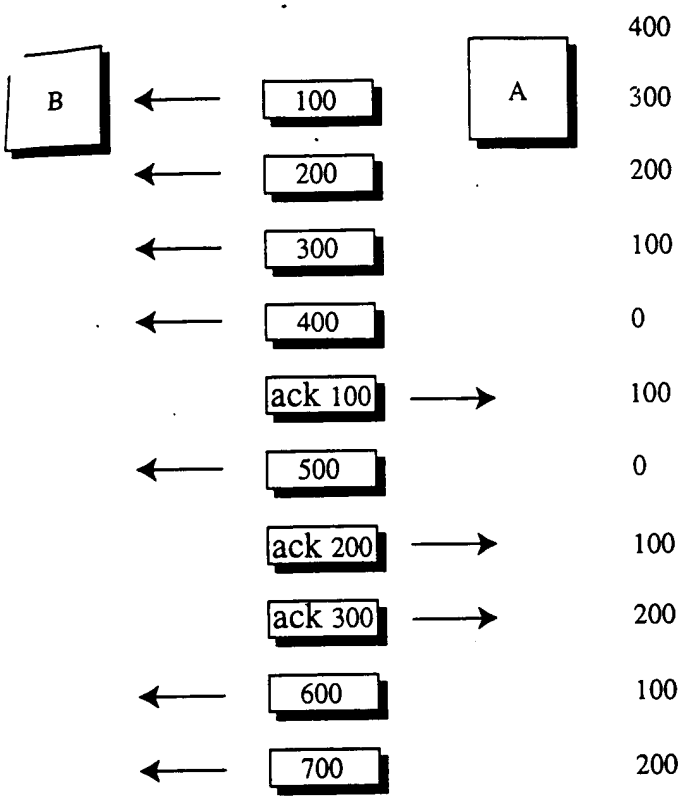

FIGURE 14a

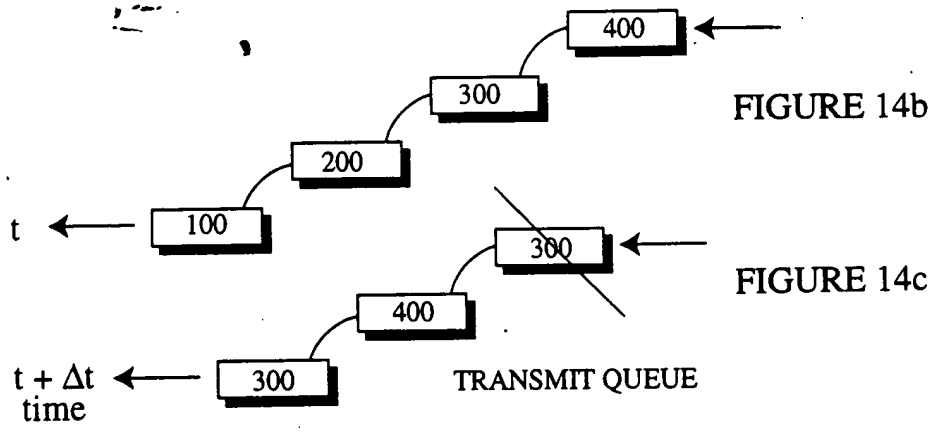

FIGURE 14b

FIGURE 14c

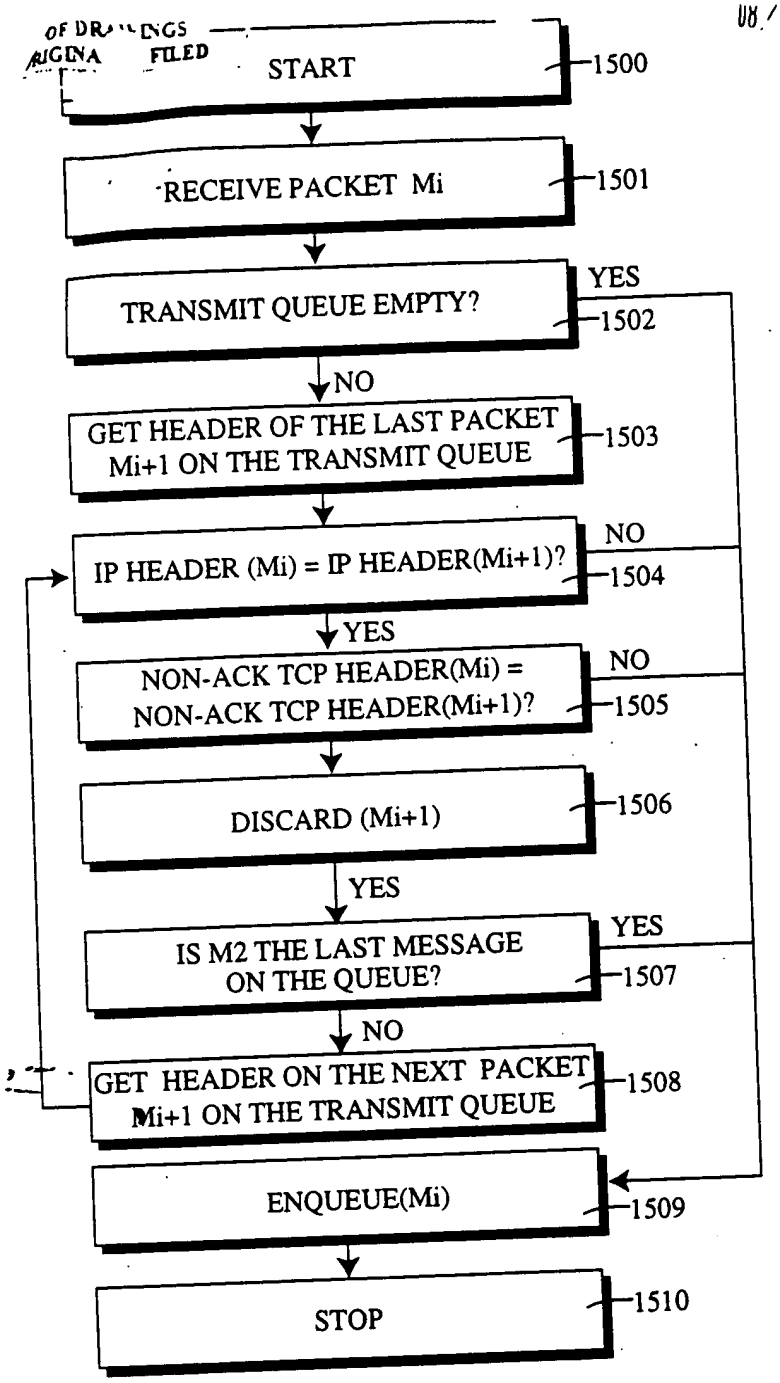

FIGURE 15

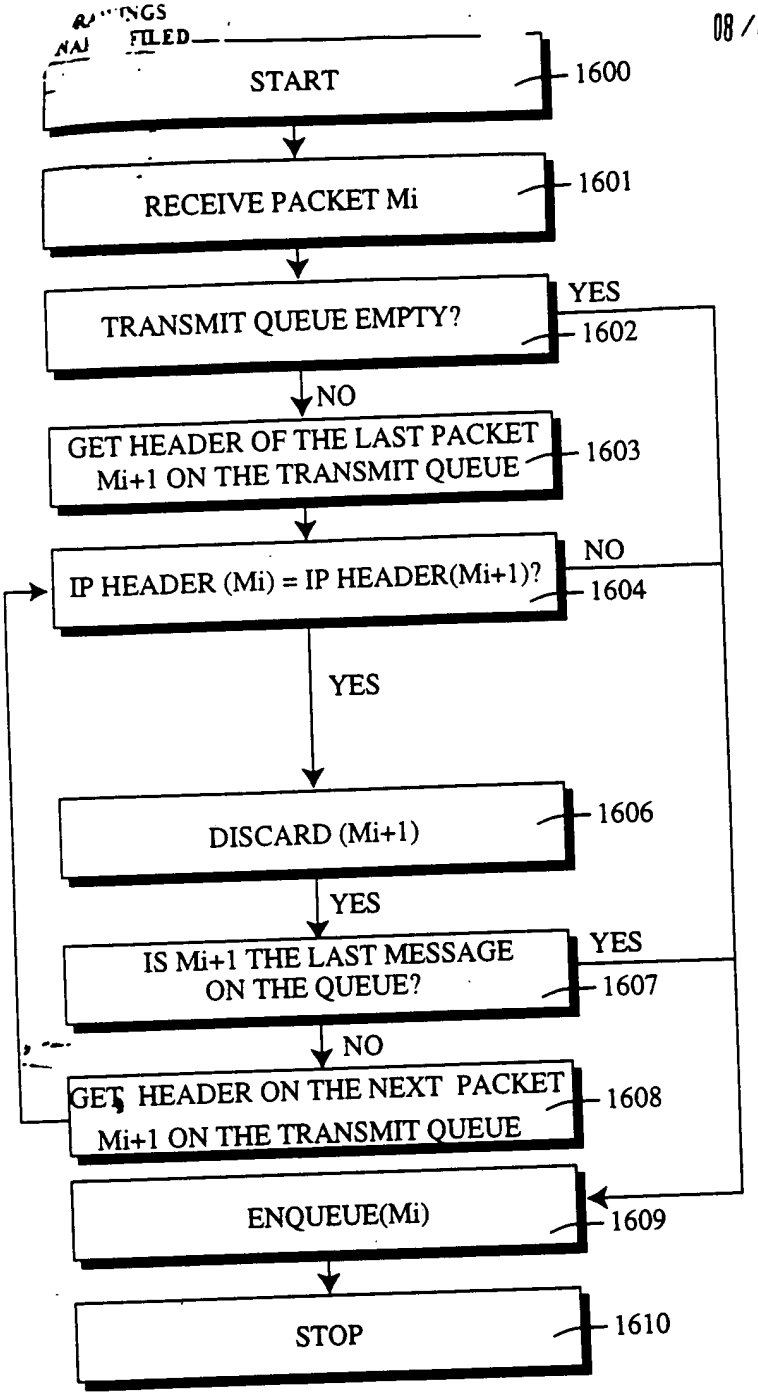
START
1600
RECEIVE PACKET Mi
1601
TRANSMIT QUEUE EMPTY?
YES
1602
NO
GET HEADER OF THE LAST PACKET Mi+1 ON THE TRANSMIT QUEUE
1603
IP HEADER (Mi) = IP HEADER(Mi+1)?
NO
1604
YES
DISCARD (Mi+1)
1606
YES
IS Mi+1 THE LAST MESSAGE ON THE QUEUE?
YES
1607
NO
GET HEADER ON THE NEXT PACKET Mi+1 ON THE TRANSMIT QUEUE
1608
ENQUEUE(Mi)
1609
STOP
1610

FIGURE 16

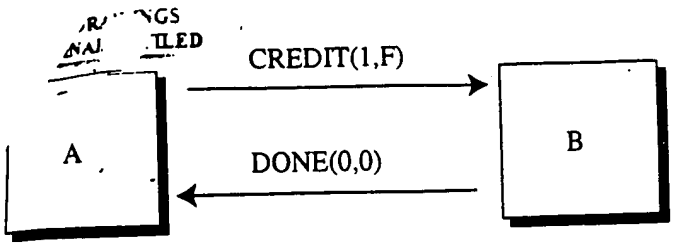

FIGURE 17

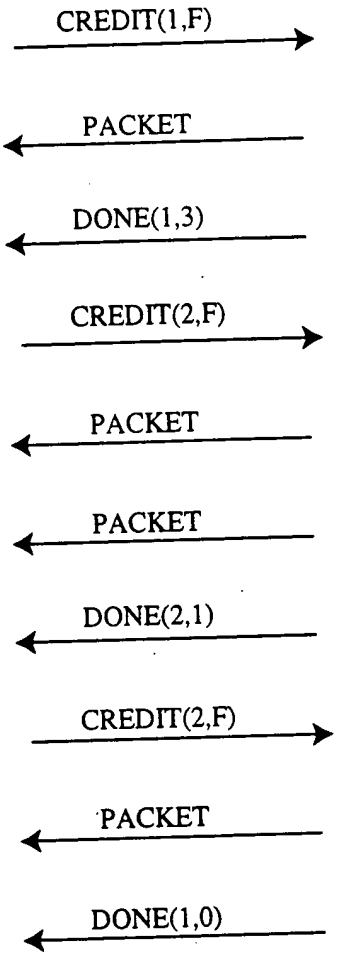

FIGURE 18

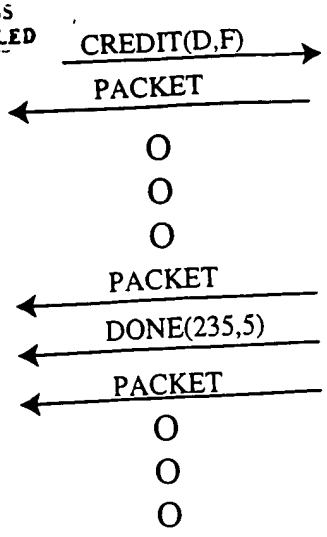

FIGURE 19

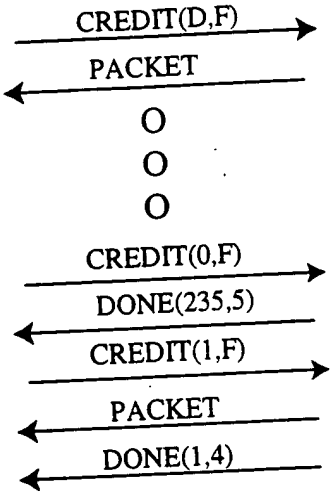

FIGURE 20

2603 9/03

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UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS:	EDUARDO J. MOURA and JAN MAKSYMILLIAM GRONSKI
SERIAL NO.:	08/426,920
FILING DATE:	APRIL 21, 1995
TITLE:	ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD
EXAMINER:	UNKNOWN
GROUP ART UNIT:	2603
ATTY.DKT.NO.:	1572

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

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No fee is deemed necessary. However, the Commissioner is hereby authorized to charge any fees which may be required to Deposit Account No. 19-2555, and a duplicate copy of this authorization is enclosed.

Respectully submitted,

Robert P. Sabath, No. 29,107
Fenwick & West
Two Palo Alto Square, Suite 600
Palo Alto, California 94306
(415)494-0600

I hereby certify that this paper is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on this date:
8/7/96
Date
Registration No. 29,107
Attorney for Applicant(s)

18323-01572/345648.1

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Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTORNEY DOCKET NO.	DRWGS	TOT CL	IND CL
08/426,920	04/21/95	2603	$762.00	1572	20	25	12

ROBERT P SABATH
FENWICK & WEST
TWO PALO ALTO SQUARE SUITE 500
PALO ALTO CA 94306

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Applicant(s)

EDUARDO J. MOURA, SAN JOSE, CA; JAN M. GRONSKI,
PALO ALTO, CA.

FOREIGN FILING LICENSE GRANTED 07/29/95

* SMALL ENTITY

TITLE
ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

PRELIMINARY CLASS: 370

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(see reverse)

H000090

FORM PTO-1082 (Modified)

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Washington, D.C. 20231

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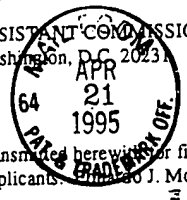


Transmitted herewith for filing is the patent application of Applicants: Ernesto J. Moura and Jan Maksymiliam Gronski

Title: ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

CERTIFICATION UNDER 37 CFR 1.10 08/426920

I hereby certify that this New Application Transmittal and the documents referred to as enclosed therein are being deposited with the United States Postal Service on this date April 21, 1995 in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number TB826258763US addressed to: Box Patent Application, The Commissioner of Patents and Trademarks. Washington, D.C., 20231

Debra A. Villanueva
(Type or print name of person mailing paper)

Debra A. Villanueva
(Signature of person mailing paper)

Enclosed are:

[X] 41 pages of specification (including claims and abstract).
[X] Declaration or oath.
[X] 20 sheets of [X] informal [] formal drawing(s).
[X] An assignment and assignment transmittal
[X] A power of attorney.
[X] 1 verified statement(s) to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.
[ ] Information Disclosure Statement and PTO-1449.
[ ] A certified copy of a _____ application.

The filing fee has been calculated as shown below:

	(Col. 1)	(Col.2)	SMALL ENTITY			OTHER THAN A SMALL ENTITY	
FOR:	NO. FILED	NO. EXTRA	RATE	FEE	OR	RATE	FEE
BASIC FEE				$365.00	OR		$
TOTAL CLAIMS	25 - 20 =	5	x $11 =	$ 55.00	OR	x $22 =	$
INDEP CLAIMS	12 - 3 =	9	x $37 =	$333.00	OR	x $74 =	$
☐ MULTIPLE DEPENDENT CLAIM PRESENTED			+$115 =	$-0-	OR	+$230 =	$
			TOTAL	$793.00	OR	TOTAL	$

* If the difference in Col. 1 is less than zero, enter "0" in Col. 2

[X] Please charge Deposit Account No. 19-2555 the amount of $_____ for filing fee [X] and recording of assignment. **A duplicate sheet is attached.**

[X] A check for $793.00 to cover the filing fee [] and recording of assignment is enclosed.

[X] Authorization to Charge Additional Fees
The Commissioner is hereby authorized to charge any additional fees (or credit any overpayment) associated with this communication and which may be required under 37 CFR 1.16 or 1.17 to Account No. 19-2555.
A duplicate sheet is attached.

Respectfully submitted,

Dated: April 21, 1995

Case Docket No. 1572

Robert P. Sabath, Reg. No. 29,107
FENWICK & WEST
Two Palo Alto Square, #600
Palo Alto, California 94306

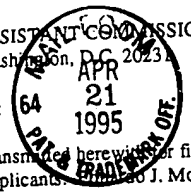
PAT 10516
4.3: PTO-1082 W/ EXP.MAIL CERT.

18323-01572/311907.1/04-21-95/04:54 PM

FORM PTO-1082 (Modified)

ASSISTANT COMMISSIONER OF PATENTS
Washington, D.C. 20231

Sir:



Transmitted herewith for filing is the patent application of
Applicants: Fernando J. Moura and Jan Maksymiliam Gronski

Title: ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

CERTIFICATION UNDER 37 CFR 1.10 08/426920

I hereby certify that this is New Application Transmittal and the documents referred to as enclosed therein are being deposited with the United States Postal Service on this date April 21, 1995 in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number TB826258763US addressed to: Box Patent Application, The Commissioner of Patents and Trademarks. Washington, D.C., 20231

Debra A. Villanueva
(Type or print name of person mailing paper)

Debra A. Villanueva
(Signature of person mailing paper)

Enclosed are:
[X] 41 pages of specification (including claims and abstract).
[X] Declaration or oath.
[X] 20 sheets of [X] informal [] formal drawing(s).
[X] An assignment and assignment transmittal
[X] A power of attorney.
[X] 1 verified statement(s) to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.
[ ] Information Disclosure Statement and PTO-1449.
[ ] A certified copy of a _____ application.

The filing fee has been calculated as shown below:

	(Col. 1)	(Col.2)	SMALL ENTITY			OTHER THAN A SMALL ENTITY	
FOR:	NO. FILED	NO. EXTRA	RATE	FEE	OR	RATE	FEE
BASIC FEE				$365.00	OR		$
TOTAL CLAIMS	25 - 20 =	5	x $11 =	$ 55.00	OR	x $22 =	$
INDEP CLAIMS	12 - 3 =	9	x $37 =	$333.00	OR	x $74 =	$
☐ MULTIPLE DEPENDENT CLAIM PRESENTED			+$115 =	$-0-	OR	+$230 =	$
			TOTAL	$793.00	OR	TOTAL	$

* If the difference in Col. 1 is less than zero, enter "0" in Col. 2

[X] Please charge Deposit Account No. 19-2555 the amount of $_____ for filing fee [X] and recording of assignment. **A duplicate sheet is attached.**

[X] A check for $ 793.00 to cover the filing fee [] and recording of assignment is enclosed.

[X] Authorization to Charge Additional Fees
The Commissioner is hereby authorized to charge any additional fees (or credit any overpayment) associated with this communication and which may be required under 37 CFR 1.16 or 1.17 to Account No. 19-2555.
A duplicate sheet is attached.

Respectfully submitted,

Dated: April 21, 1995

Case Docket No. 1572

Robert P. Sabath, Reg. No. 29,107
FENWICK & WEST
Two Palo Alto Square, #600
Palo Alto, California 94306

PAT 10516
4.3: PTO-1082 W/ EXP.MAIL CERT.

18323-01572/311907.1/04-21-95/04:54 PM

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 1994

Application or Docket Number: 426920

CLAIMS AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA
BASIC FEE		
TOTAL CLAIMS	25 minus 20 =	* 5
INDEPENDENT CLAIMS	12 minus 3 =	* 9
MULTIPLE DEPENDENT CLAIM PRESENT		

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY RATE	SMALL ENTITY FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY FEE
	365.00	OR		730.00
x$11=	55	OR	x$22=	110
x38=	342	OR	x76=	
+120=		OR	+240=	
TOTAL	762	OR	TOTAL	

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 11	Minus	** 25	= —
Independent	* 4	Minus	*** 12	= —
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

SMALL ENTITY RATE	SMALL ENTITY ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDITIONAL FEE
x$11=	—	OR	x$22=	
x38=	—	OR	x76=	
+120=		OR	+240=	
TOTAL ADDIT. FEE	—	OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total RCB	* 61	Minus	** 25	= 36
Independent	* 17	Minus	*** 12	= 5
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

SMALL ENTITY RATE	SMALL ENTITY ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDITIONAL FEE
x$11=	396.00	OR	x$22=	
~~39.00~~ x38=	195.00	OR	x76=	
+120=		OR	+240=	
TOTAL ADDIT. FEE	Paid	OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 61	Minus	** 61	= —
Independent	* 17	Minus	*** 17	= —
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				

SMALL ENTITY RATE	SMALL ENTITY ADDITIONAL FEE	OR	OTHER THAN SMALL ENTITY RATE	OTHER THAN SMALL ENTITY ADDITIONAL FEE
x$11=	—	OR	x$22=	
x38=	—	OR	x76=	
+120=		OR	+240=	
TOTAL ADDIT. FEE	—	OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
*** If the Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Form PTO 1130
(REV 2/94)

PACE DATA ENTRY CODING SHEET

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

1ST EXAMINER: Mauro — DATE: 5-1995

2ND EXAMINER: — DATE:

APPLICATION NUMBER	TYPE APPL	FILING DATE (MONTH DAY YEAR)	SPECIAL HANDLING	GROUP ART UNIT	CLASS	SHEETS OF DRAWING
08/426920	1	04 21 95	0	2603	370	20

TOTAL CLAIMS	INDEPENDENT CLAIMS	SMALL ENTITY?	FILING FEE	FOREIGN LICENSE	ATTORNEY DOCKET NUMBER
25	12	2	762	N	1572

CONTINUITY DATA

CONT CODE	STATUS CODE	PARENT APPLICATION SERIAL NUMBER	PCT APPLICATION SERIAL NUMBER	PARENT PATENT NUMBER	PARENT FILING DATE (MONTH DAY YEAR)
			PCT/		
			PCT/		
			PCT/		
			PCT/		
			PCT/		

PCT/FOREIGN APPLICATION DATA

FOREIGN PRIORITY CLAIMED	COUNTRY CODE	PCT/FOREIGN APPLICATION SERIAL NUMBER	FOREIGN FILING DATE (MONTH DAY YEAR)

USGPO 1994-384-021

IN THE

UNITED STATES PATENT AND TRADEMARK OFFICE

03 CO #2
6/12 CW
11-30-95
Prior Art

APPLICANT:	Eduardo J. Moura and Jan Maksymilian Gronski
SERIAL NO.:	08/426,920
FILING DATE:	April 21, 1995
TITLE:	Assymetric Hybrid Access System and Method
EXAMINER:	Unknown
GROUP ART UNIT:	2603
ATTY. DKT. NO.:	1572

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

INFORMATION DISCLOSURE STATEMENT
Under 37 C.F.R. §§ 1.56 and 1.97-98

SIR:

Pursuant to the provisions of 37 C.F.R. §§ 1.56 and 1.97-98, enclosed herewith is modified form PTO-1449 listing references for consideration by the Examiner. A copy is enclosed herewith of each listed reference which may be material to the examination of this application, and with respect to which there may be a duty to disclose.

The filing of this Information Disclosure Statement shall not be construed as a representation regarding the completeness of the list of references, or that inclusion of a reference in this list is an admission that it is prior art or is pertinent to this application, or that a search has been made, or as an admission that the information listed is, or may be considered to be, material to patentability, or that no other material information exists, and shall not be construed as an admission against interest in any manner.

[ ] This application relies, under 35 U.S.C. § 120, on the earlier filing date of prior application Serial No._____, filed on _____, and the references cited therein are hereby referenced, but are not required to be provided in this application under 37 C.F.R. § 1.98(d).

The Information Disclosure Statement submitted herewith is being filed:

[X] within three months of the filing date of the application, or date of entry into the national stage of an international application, or before the mailing date of a first official action on the merits, whichever event last occurred; or

[ ] after three months of the filing date of this national application or the date of entry of the national stage in an international application, or after the mailing date of the first official action on the merits, whichever event last occurred, but before the mailing date of the first to occur of either:

(1) a final action under 37 C.F.R. §1.113; OR

(2) a notice of allowance under 37 C.F.R. §1.311; AND

[ ] is accompanied by the fee (under 37 C.F.R. §1.17(p)) for submission of this Information Disclosure Statement under 37 C.F.R. § 1.97(c); OR

[ ] is accompanied by the following certification under 37 C.F.R. § 1.97(e) that:

[ ] each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Statement; OR

[ ] no item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the person signing this certification after making reasonable inquiry, was known to any individual designated under 37 C.F.R. § 1.56(c) more than three months prior to the filing of this Statement.

[ ] Attached hereto is a check in the amount of $210.

[X] The Commissioner is hereby authorized to charge Deposit Account No. 19-2555 for any additional fees (and to credit any overpayment) associated with this Information Disclosure Statement. A duplicate copy of this authorization is attached.

[X] This Information Disclosure Statement is made by:

[ ] The undersigned inventor; or

[X] The undersigned attorney of records on the basis of the information:

[ ] supplied by the inventor;

[ ] supplied by an individual associated with the filing and prosecution of this application under 37 C.F.R. §1.56(c);

[X] in the attorney's files.

Consideration of the listed references and favorable action are solicited.

Respectfully submitted,

Dated: 8/24/95

Robert P. Sabath, Reg. No. 29,107
Fenwick & West
Two Palo Alto Square, Suite 600
Palo Alto, California 94306
(415) 494-0600

#2

IN THE

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Eduardo J. Moura and Jan Maksymilian Gronski
SERIAL NO.:	08/426,920
FILING DATE:	April 21, 1995
TITLE:	Assymetric Hybrid Access System and Method
EXAMINER:	Unknown
GROUP ART UNIT:	2603
ATTY. DKT. NO.:	1572

I hereby certify that this correspondence is being deposited with the United Postal Service as first class mail in an envelope addressed to: Assistant Commissioner For Patents, Washington, D.C. 20231, on:

8/24/95
Date of Deposit

Robert P. Smith
Name of applicant, assignee or Registered Representative

Signature

8/24/95
Date of Signature

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

INFORMATION DISCLOSURE STATEMENT
Under 37 C.F.R. §§ 1.56 and 1.97-98

SIR:

Pursuant to the provisions of 37 C.F.R. §§ 1.56 and 1.97-98, enclosed herewith is modified form PTO-1449 listing references for consideration by the Examiner. A copy is enclosed herewith of each listed reference which may be material to the examination of this application, and with respect to which there may be a duty to disclose.

The filing of this Information Disclosure Statement shall not be construed as a representation regarding the completeness of the list of references, or that inclusion of a reference in this list is an admission that it is prior art or is pertinent to this application, or that a search has been made, or as an admission that the information listed is, or may be considered to be, material to patentability, or that no other material information exists, and shall not be construed as an admission against interest in any manner.

[ ] This application relies, under 35 U.S.C. § 120, on the earlier filing date of prior application Serial No._____, filed on _____, and the references cited therein are hereby referenced, but are not required to be provided in this application under 37 C.F.R. § 1.98(d).

The Information Disclosure Statement submitted herewith is being filed:

[X] within three months of the filing date of the application, or date of entry into the national stage of an international application, or before the mailing date of a first official action on the merits, whichever event last occurred: or

[ ] after three months of the filing date of this national application or the date of entry of the national stage in an international application, or after the mailing date of the first official action on the merits, whichever event last occurred, but before the mailing date of the first to occur of either:

(1) a final action under 37 C.F.R. §1.113: OR

(2) a notice of allowance under 37 C.F.R. §1.311: AND

[ ] is accompanied by the fee (under 37 C.F.R. §1.17(p)) for submission of this Information Disclosure Statement under 37 C.F.R. § 1.97(c): OR

[ ] is accompanied by the following certification under 37 C.F.R. § 1.97(e) that:

[ ] each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Statement: OR

[ ] no item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the person signing this certification after making reasonable inquiry, was known to any individual designated under 37 C.F.R. § 1.56(c) more than three months prior to the filing of this Statement.

[ ] Attached hereto is a check in the amount of $210.

[X] The Commissioner is hereby authorized to charge Deposit Account No. 19-2555 for any additional fees (and to credit any overpayment) associated with this Information Disclosure Statement. A duplicate copy of this authorization is attached.

[X] This Information Disclosure Statement is made by:

[ ] The undersigned inventor; or

[X] The undersigned attorney of records on the basis of the information:

[ ] supplied by the inventor;

[ ] supplied by an individual associated with the filing and prosecution of this application under 37 C.F.R. §1.56(c);

[X] in the attorney's files.

Consideration of the listed references and favorable action are solicited.

Respectfully submitted,

Dated: 8/29/95

Robert P. Sabath, Reg. No. 29,107
Fenwick & West
Two Palo Alto Square, Suite 600
Palo Alto, California 94306
(415) 494-0600

#2

INFORMATION DISCLOSURE CITATION (Use several sheets if necessary)		Atty. Docket No.: 1572	Serial No.: 08/426,920
		Applicants: Eduardo J. Moura et al.	
		Filing Date: April 21, 1995	Group: 2603

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Sub-class	Filing Date If Appropriate
SH	A	4,538,174	8/27/85	Gargini et al.	358	86	
	B	4,623,920	11/18/86	Dufresme et al.	358	122	
	C	4,684,981	8/4/87	Toyoshima et al.	358	86	
	D	4,823,386	4/18/89	Dumbauld et al.	380	13	
SH	E	4,829,569	5/9/89	Seth-Smith et al.	380	10	
	F	4,894,789	1/90	Yee	358	86	
SH	G	4,928,177	5/22/90	Martinez	358	142	
	H	4,982,486	1/91	Johnson et al.	455	5.1	
	I	5,013,125	5/91	Pocock et al.	455	4.2	
	J	5,051,822	9/24/91	Rhoades	358	86	
	K	5,093,718	3/92	Hoarty et al.	358	86	
SH	L	5,181,107	1/19/93	Rhoades	358	86	
	M	5,247,347	9/21/93	Litteral et al.	358	85	
SH	N	5,347,304	9/13/94	Moura et al.	348	12	

FOREIGN PATENT DOCUMENTS

		Document Number	Date	Country	Class	Sub-class	Translation Yes	Translation No
		SEE NEXT PAGE						

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

		SEE NEXT PAGE	

EXAMINER S. Hom DATE CONSIDERED 3-20-96

EXAMINER: Initial if references considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Form PTO-FB-A820

INFORMATION DISCLOSURE CITATION (Use several sheets if necessary)	Atty. Docket No.: 1572	Serial No.: 08/426,920
	Applicants: Eduardo J. Moura et al.	
	Filing Date: April 21, 1995	Group: 2603

U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Sub-class	Filing Date If Appropriate

FOREIGN PATENT DOCUMENTS

		Document Number	Date	Country	Class	Sub-class	Translation Yes	Translation No
sh	0	91/06160 A	5/2/91	WO	H04H	1/02	X	
	P	33 12 723 A1	10/27/83	DE	H04H	1/00		X
	Q	0 144 801 A3	6/19/85	EP	H04H	1/00	X	
sh	R	0 401 873 A3	12/12/90	EP	H04N	7/087	X	

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

	S		Descriptive material describing Row-Grabbing System of information retrieval developed by IDR.

EXAMINER S. Hom DATE CONSIDERED 3-20-96

EXAMINER: Initial if references considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

130.00 122 Gp 2603

IN THE

UNITED STATES PATENT AND TRADEMARK OFFICE

Petition to make Special 1-13-96 W. Little

APPLICANTS:	Eduardo J. Moura and Jan Maksymilian Gronski
SERIAL NO:	08/426,920
FILED:	April 21, 1995
TITLE:	ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD
EXAMINER:	To be assigned
GROUP ART UNIT:	2603
ATTY.DKT.NO.:	1572

EM248525802US

"Express Mail" mailing label number _____

Date of Deposit January 18, 1996

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner For Patents, Washington, D.C. 20231.

Mike Spilman

Mike Spilman
Signature

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

PETITION TO MAKE SPECIAL

Sir:

Pursuant to 37 C.F.R. §1.102, and consistent with the procedural requirements outlined in M.P.E.P. §708.02 (VIII), Applicants hereby petition to make the above identified patent application special. Applicants submit the fee of $130.00 as set forth in 37 C.F.R. §1.17(i)(2).

Applicants assert that all claims in the above-identified application are directed to a single invention. Applicants also assert that, if the Office determines that all the claims presented are not obviously directed to a single invention, Applicants will make an election without traverse as a prerequisite to the grant of special status.

Applicants assert that a pre-examination search was conducted by a professional searcher at the U.S. Patent and Trademark Office. The search covered: (1) Class 340, Subclass 825.08; (2) Class 348, Subclasses 7, 12, 13, 14, and 17; (3) Class 370, 85.8, 85.11, 85.13, 85.14, 94.1, 94.2, and 95.5; (4) Class 395, Subclasses 200.02, 205.06,

and 200.2; and (5) Class 455, Subclasses 4.1, 4.2, 5.1, and 6.1. The search resulted in identification of the following U.S. Patent documents:

1. U.S. Patent No. 4,924,461 issued to Amemiya et al. (Amemiya I).
2. U.S. Patent No. 5,166,675 issued to Amemiya et al. (Amemiya II).
3. U.S. Patent No. 5,410,343 issued to Coddington et al.

Copies of these references are enclosed herewith.

A detailed discussion of these references are provided below. This discussion points out, with the particularity required by 37 C.F.R. §1.111(b) and (c), how the claimed subject matter is distinguishable over this reference.

U.S. Patent No. 4,924,461 issued to Amemiya et al. (Amemiya I)

This reference, as understood, discloses a polling technique, as illustrated in Figure 3, in which a master station 1 polls over a downstream channel 3 a number of slave stations TE_{1-n} which issue requests for communication to the master station 1 over an upstream channel 4. After receiving a transmission grant from the master station 1, data is transmitted from the slave station to the master station over the upstream channel 4.

The present invention, as claimed, is clearly distinguishable over this reference. First, the present invention is limited to a metropolitan area network system and upstream and downstream routers operating at different speeds in a hybrid access system. Amemiya I does not show nor suggest internetwork elements such as routers operating at different upstream and downstream speeds. Hence, Applicants submit that the claimed invention is patentable over Amemiya I.

U.S. Patent No. 5,166,675 issued to Amemiya et al. (Amemiya II)

This reference, as understood, discloses a polling technique over a downstream channel and an upstream channel between a master station and a plurality of slave stations, but not in an asymmetric network for accessing a plurality of remote personal computers for high speed transmission.

The present invention, as claimed, is clearly distinguishable over this reference. First, the present invention is limited to a metropolitan area network system and upstream and downstream routers operating at different speeds in a hybrid access system. Amemiya II does not show nor suggest internetwork elements such as routers operating at different upstream and downstream speeds. Hence, Applicants submit that the claimed invention is patentable over Amemiya II.

U.S. Patent No. 5,410,343 issued to Coddington et al. (Coddington et al.)

This reference, as understood, discloses a video-on-demand system using an asymmetric transmission system over standard telephone lines in which requests for video are transmitted from one of a number of subscriber terminals over a low speed upstream channel to a central office from which video is transmitted downstream over a high speed channel to the subscribers. The central station 10 includes a video gateway 30 which distributes video programming in response to subscriber requests. This invention does not address asymmetric broadband data transmission systems over mixed medium environments that use analog broadcast techniques in the downstream direction with independent upstream channels.

The present invention, as claimed, is clearly distinguishable over this reference. First, the present invention is limited to a metropolitan area network system and upstream and downstream routers operating at different speeds in a hybrid access system. Coddington et al. does not show nor suggest internetwork elements such as

routers operating at different upstream and downstream speeds. Hence, Applicants submit that the claimed invention is patentable over Coddington et al.

Applicants submit that the present petition satisfies all of the requirements of 37 C.F.R. §1.102. Favorable action is respectfully requested.

Respectfully submitted,

Eduardo J. Moura
Jan Maksymilian Gronski

Dated: 1/18/96

By: _____
Robert P. Sabath
Registration No. 29,107
FENWICK & WEST
Two Palo Alto Square, Suite 600
Palo Alto, California 94306
(415) 858-7153

IN THE

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS:	Eduardo J. Moura and Jan Maksymilian Gronski
SERIAL NO:	08/426,920
FILED:	April 21, 1995
TITLE:	ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD
EXAMINER:	To be assigned
GROUP ART UNIT:	2603
ATTY.DKT.NO.:	1572

EM248525802US
"Express Mail" mailing label number
Date of Deposit January 18, 1996

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner For Patents, Washington, D.C. 20231.

Mike Spilman
Signature

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Please cancel claims 7-14, 16, 18, and 21-23.

Respectfully submitted,

Eduardo J. Moura
Jan Maksymilian Gronski

Dated: 1/18/96

By:
Robert P. Sabath
Registration No. 29,107
FENWICK & WEST
Two Palo Alto Square, Suite 600
Palo Alto, California 94306
(415) 858-7153

18323-01572/390178.1

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

#4

MAILED

FEB 23 1996

GROUP 2600

In re Application of:
Eduardo J. Moura
Serial Number: 08/426,920
Filed: April 21, 1995
For: ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

PETITION TO MAKE SPECIAL
ACCELERATED EXAMINATION

This is in response to the petition filed January 18, 1996, requesting to Make Special the above identified application under 708.02, paragraph VIII of the M.P.E.P.

The petition has been considered and found to have complied with all the requirements set forth under the above-noted section, therefore, the petition is GRANTED.

SUMMARY: The petition is GRANTED.

Henry P. Sabin for

Nicholas P. Godici, Director
Group 2600, Communications, Measuring, Testing, and Lamp/Discharge Group

ROBERT P. SABATH
FENWICK & WEST
TWO PALO ALTO SQUARE, SUITE 500
PALO ALTO, CA 94306

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/426,920	04/21/95	MOURA	1572

EXAMINER	
	HENLEY

ART UNIT	PAPER NUMBER
2603	5

DATE MAILED: 04/03/96

ROBERT P SABATH
FENWICK & WEST
TWO PALO ALTO SQUARE SUITE 500
PALO ALTO CA 94306

Please find ~~below and/or~~ attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

A shortened ~~statutory~~ period for response to this action is set to expire three month(s), or thirty days, whichever is longer, from the date of this communication.

PTO-90C (REV. 2/95)

1 - File Copy

Office Action Summary

Application No.	Applicant(s)
08/426,920	Moura et al.
Examiner	**Group Art Unit**
Shick Hom	2603

☒ Responsive to communication(s) filed on *Jan 18, 1996*

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-25* is/are pending in the application.

Of the above, claim(s) *7-14, 16, 18, and 21-23* is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-6, 15, 17, 19, 20, 24, and 25* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). *2*

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

H0000110

Part III DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed 8-28-95 fails to comply with 37 CFR § 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered as to the merits.

The return copy of form 1449 shows the missing references.

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

3. The application is objected to because of alterations which have not been initialed and/or dated as is required by 37 CFR 1.52(c) and 1.56. A properly executed oath or declaration which complies with 37 CFR 1.67(a) and identifies the application by serial number and filing date is required.

Fig. 7 and claim 1 contain alterations which are not dated.

Claim Objections

4. Although applicant's claims 1-6, 17, and 20 meet the requirement of 112/2d, i.e. the metes and bounds are determinable, the grammar and syntax could be improved. Examples are in claim 1, line 11 which recite "said high speed downstream channel" lacks clear antecedent basis. No high speed downstream channel has been previously recited in the claim and therefore the limitation is not understood. In claim 1, line 16 which recite "a corresponding at least a single client data processor" is confusing, suggest delete "a corresponding". In claim 5, line 2 which recites "a router" is not clear as to whether it is reciting either said downstream router or upstream router of claim 1, lines 5 and 7 or what. In claim 17, line 8-9 which recite "said second transmit queue" lacks clear antecedent basis. No second transmit queue has been previously recited in the claim. In claim 19, line 3-5 which recite transmitting indications and confirming receipt of a first power level indication is not clear as to whether the first power level indication is included in the transmitted indications or what. It is in the best interest of the patent community that applicant, in his/her normal review and/or rewriting of the

claims, to take into consideration these editorial situations and make changes as necessary.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 17, 19, 20, and 24-25 are rejected under 35 U.S.C. § 102(b) as being anticipated by McMullan, Jr. et al.

McMullan, Jr. et al. disclose all the subject matter claimed. Note column 29, line 39 to col. 30, line 16 which recite the message queue for buffering the data packets for transmission to the system manager and filtering out prior transmission to the system manager by matching address and discarding duplicate data clearly anticipate the step of transmitting data from a transmit queue and the step of eliminating from the queue data which are redundant as in claims 17 and 20. Col. 30, lines 8-16 which recite the step of acknowledging the transmission with an ACK from the system manager clearly anticipate the step of acknowledging transmitted data as in claim 17.

Col. 46, lines 46-61 which recite the step of transmitting power level calibration data at the initiate calibration time including the step of storing the boundaries for optimum level and determining whether transmission is at optimum level. If the level is too low the low levels are discarded until an ok level is received clearly anticipate the step of transmitting indications at selected different power levels, confirming receipt of power level indication and setting level of transmission with confirmation of receipt as in claim 19.

Col. 15, line 59 to col. 16, line 2 which recite the quality of channels and switching channels due to interferences, i.e. signal to noise ration, clearly anticipate the steps of detecting the quality characteristic of a channel, determining whether it deviates with respect to a norm and switching to another channel if there's sufficient deviation as in claims 24 and 25. Further, col. 49, lines 35-50 which recite the step of calculating the bit error rate during calibration for the purpose of frequency selection by the system manager clearly anticipate the quality characteristics including error frequency.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in

section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103, the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103.

8. Claims 1-6, and 15 are rejected under 35 U.S.C. § 103 as being unpatentable over Litteral et al. in view of Wheeler et al.

Litteral et al. disclose nearly all the subject matter claimed. Note column 5, line 57 to col. 6, line 30 which recite the system of providing video-on-demand data to subscriber premises using a downstream channel for high speed transmission of information and an upstream channel which operates at a lower speed than the downstream channel clearly anticipate the hybrid access system for connecting a data processor with a network using a high speed downstream channel and an independent upstream

channel at a lower speed than the downstream channel. Col. 8, line 60 to col. 9, line 12 recite the one-way downstream channel transmitting digitized video signals at 1.544 megabit per second and the low speed data channel of 32 kilobit per second used for transfer of operations, administration, maintenance, and provisioning data which clearly anticipate the hybrid system manager connected to the LAN for verifying authorized user status. Further, Fig. 2 shows the network management system connected to the data packet network which clearly anticipate the system manager connected to the LAN system. Fig. 1 shows the PC, the video display, i.e. TV connected via coax cable, and the telephone as part of the customer equipment which clearly anticipate the client data processor, the telephone network as in claim 2, and cable TV network as in claim 3. Fig. 1 shows the satellite transmission dish for broadcasting at the server site which clearly anticipate the broadcast unit including a satellite transmitter as in claim 6. Fig. 1 shows the multiplexers connected to the customer equipment, which clearly anticipate the remote link adapter connecting the client data processor. Col. 10, lines 47-68 which recite the infrared remote control at the subscriber premises for transmission of command data clearly anticipate the upstream channel including a wireless transmission path as in claim 4.

Litteral et al. did not teach the downstream and upstream routers connected to the LAN system including the Hybridware ™ server.

Wheeler et al. teach that it is known to provide routers including a server as set forth at column 7, line 52 to col. 8, line 2, in the field of telephonic, for the purpose of routing the bit mapped image data of facsimile images over the bus traffic through respective bridges of a distributed system, which clearly anticipate the downstream and upstream routers connected to the LAN system including a server such as the Hybridware ™ server.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Litteral et al. by providing the downstream and upstream routers connected to the LAN system including the Hybridware ™ server, as taught by Wheeler et al. The motivation being the desirable advantage of using routers and server to provide a virtual local area network for a distributed imaging system in order to achieve low cost access of image data and document in Litteral et al.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Moura et al. disclose a remote link adapter for use in TV broadcast data transmission system.

Gremillet discloses a process for the teledistribution of recorded information and a system for performing this process.

Palazzi, II et al. disclose an interactive terminal for the access of remote database information.

Smith discloses a method to enhance voice communications using encoded one-way video signals under bi-directional user or network control for transmitting stored or real-time video or image information.

Lai et al. disclose a system and method for providing SVC service through an ATM network for frame relay DTES with a terminal adapter.

Baran discloses a wide area fiber and TV cable fast packet cell network.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shick Hom whose telephone number is (703) 305-4742.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-4750.

Douglas W. Olms

DOUGLAS W. OLMS
IPERVISORY PATENT EXAMINEF
ART UNIT 263

SH
March 30, 1996

Notice of References Cited

Application No.	Applicant(s)		
08/426,920	Moura et al.		
Examiner		Group Art Unit	Page 1 of 1
Shick Hom		2603	

U.S. PATENT DOCUMENTS

	DOCUMENT NO.	DATE	NAME	CLASS	SUBCLASS
A	5,142,690	8-25-92	McMullan, Jr. et al.	370	95.2
B	5,200,993	4-6-93	Wheeler et al.	379	96
C	5,347,304	9-13-94	Moura et al.	348	5.1
D	4,499,568	2-12-85	Gremillet	379	96
E	5,327,554	7-5-94	Palazzi, III et al.	379	96
F	5,450,123	9-12-95	Smith	379	96
G	5,490,141	2-6-96	Lai et al.	370	85.13
H					
I					
J					
K					
L					
M					

FOREIGN PATENT DOCUMENTS

	DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUBCLASS
N						
O						
P						
Q						
R						
S						
T						

NON-PATENT DOCUMENTS

	DOCUMENT (Including Author, Title, Source, and Pertinent Pages)	DATE
U		
V		
W		
X		

S. Hom 9-19-96

#6

S. Horn 8/7/96

FROM

CUSHMAN DARBY & CUSHMAN, L.L.P.
Attorneys at Law
Ninth Floor, 1100 New York Avenue, N.W.
Washington, D.C. 20005-3918
Telephone: (202) 861-3000

Fimile #: (202) 822-0944 or 822-0678 or 822-0679

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Gp 1800	(703) 305-3014	Gp 3200	(703) 305-3579
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In re PATENT APPLICATION of
Inventor(s) MOURA et al.
Appln. No. 0 8 /426,920
series code ↑ ↑ serial no.
Filed: April 21, 1995

Group Art Unit: 2603
Examiner: S. Horn

Atty. Dkt. 217537 /
M# / Client Ref.

TITLE: ASYMMETRIC HYBRID
ACCESS SYSTEM

Date: July 25, 1996

Name or type of signed paper being transmitted: FACSIMILE TRANSMITTAL OF POWER OF ATTORNEY FROM ASSIGNEE AND REVOCATION OF PRIOR POWERS

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Name Lawrence Harbin Sig. _____ Date July 25, 1996

7225 / 217537
C# / M#

CDC-286 8/94

FAX RECEIVED
JUL 29 1996
GROUP 2600

OFFICIAL

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

re PATENT APPLICATION of

MOURA

Appln. No.: 08/426,920 Group Art Unit: 2603

Filed: April 21, 1995 Examiner: S. Horn

Title: ASYMMETRIC HYBRID ACCESS SYSTEM

* * * * *

July 25, 1996

FACSIMILE TRANSMITTAL OF POWER OF ATTORNEY FROM ASSIGNEE AND REVOCATION OF PRIOR POWERS

Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

Enclosed please find Power of Attorney from Assignee and Revocation of Prior Powers for the above referenced application.

Respectfully submitted,

CUSHMAN DARBY & DARBY, L.L.P.

By _____
Lawrence Harbin
Reg. No. 27,644
Tel: (202) 861-3716
Fax: (202) 822-0944

LH:er

1100 New York Avenue, N.W.
Ninth Floor
Washington, D.C. 20005-3918
(202) 861-3000

UNITED STATES PATENT AND TRADEMARK OFFICE

OFFICIAL

PAT APPLICATION of

Inventor(s): Eduardo J. Moura, et al.

Group Art Unit: 2603

Examiner: Shick Hom

Appln. No.: 08/426,829 (series code / serial no.)

Atty. Dkt: 7226/ 217637 (Mtr / Client Ref.)

Filing Date: April 21, 1995

Title: Asymmetric Hybrid Access System

POWER OF ATTORNEY FROM ASSIGNEE AND REVOCATION OF PRIOR POWERS

Hon. Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

The undersigned being the assignee of record in the above-entitled patent application as shown by the chain of title from the original owner to the assignee as recorded on Reel ____, Frame ____, hereby revokes all previous powers and appoints the Cushman Darby & Cushman Intellectual Property Group of Pillsbury Madison & Sutro, LLP, Ninth Floor, East Tower 1100 New York Avenue, N.W., Washington, D.C. 20005-3918 telephone number (202) 861-3000 (to whom all communications about this application are to be directed), and the below named persons (of the same address), individually and collectively, our attorneys to prosecute this patent application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent:

Paul N. Kokulis	16773	Kendrew H. Colton	30368
Raymond F. Lippitt	17619	Chris Comuntzis	31097
G. Lloyd Knight	17698	Lawrence Harbin	27644
Carl G. Love	18781	Paul E. White, Jr.	32011
Edgar H. Martin	20534	Michelle N. Lester	32331
William K. West, Jr.	22067	Jeffrey A. Simenauer	31933
Kevin E. Joyce	20508	Robert A. Molan	29834
Edward M. Prince	22429	G. Paul Edgell	24238
David W. Brinkman	20817	Lynn E. Eccleston	35861
George M. Sirilla	18221	David A. Jakopin	32995
Donald J. Bird	25323	Mark G. Paulson	30793
W. Warren Taltavull	28647	John P. Moran	30906
Peter W. Gowdey	25872	Timothy J. Klima	34852
Dale S. Lazar	28872	James D. Berquist	34776
Glenn J. Perry	28458	Stephen C. Glazier, P.C.	31361

Assignee has reviewed the evidentiary document(s) for the aforesaid chain of title and hereby certifies that, to the best of assignee's knowledge and belief, title is in the undersigned assignee. Address all further correspondence to Lawrence Harbin, 1100 New York Avenue, N.W., Suite 900 East Tower, Washington, D.C. 20005-3918 whose telephone number is (202) 861-3718.

Hybrid Networks, Inc.
Assignee

By _____
Name: Richard Fuller
Title: Vice President

7/15/96
Date

FAX RECEIVED
JUL 29 1996
GROUP 2600

EXHIBIT D

CTC-288 6/94

SUPPLEMENTAL DECLARATION — PATENT APPLICATION

SOLE/JOINT

As a below named inventor, I hereby declare: THAT I verily believe I am the original, first and sole (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the invention described and claimed in United States Application No. 08/426,920, filed on April 21, 1995 and entitled:

Asymmetric Hybrid Access System and Method, as initially filed and as initialed in Fig. 7 and in claim 1, and

that the subject matter of claim(s) Nos. 1-6, 13, 17, 19-20, 24-25 and 26-74 x one) [x] per Amendment dated July 31, 1996

box only [ ] as allowed

was part of my or our invention and was invented before the filing of the original application, above identified, and of its parent application(s) (if this is a continuing application thereof) for such invention; that I have reviewed and understand the contents of the specification, including (to the best of my ability) the claim(s), as above amended/allowed; that I acknowledged my duty to disclose all information known to me to be material to patentability of this application (including, if this is a CIP, in so far as the subject matter disclosed and claimed in this application is in addition to that disclosed in said parent application(s), my duty to disclose all information known to me to be material to patentability which became available between the filing date of said parent application(s) and the national or international filing date of this application) in accordance with 37 C.F.R. 1.56.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

(1) Inventor's Signature Eduardo J. Moura Date Aug 1, 1996

Inventor's Name(typed) Eduardo J. Moura
First Middle Initial Family Name

(2) Inventor's Signature Jan Makrygiannis Gronski Date 8/1/96

Inventor's Name(typed) Jan Makrygiannis Gronski
First Middle Initial Family Name

(3) Inventor's Signature _____ Date _____

Inventor's Name(typed) _____
First Middle Initial Family Name

(4) Inventor's Signature _____ Date _____

Inventor's Name(typed) _____
First Middle Initial Family Name

(5) Inventor's Signature _____ Date _____

Inventor's Name(typed) _____
First Middle Initial Family Name

NOTE: FOR ADDITIONAL INVENTORS, check box [ ] and attach sheet with signature and date for each.
Atty/Sec.

CTC 119 6/94

EXHIBIT D
ALL-STATE LEGAL SUPPLY CO.

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
~~08/426,920~~	4/21/95	Eduardo J. Moura	7225/217637

Lawrence Harbin
1100 New York Avenue, N. W.,
Suite 900 East Tower
Washington D.C. 20005-3918

EXAMINER	
Shick Horn	
ART UNIT	PAPER NUMBER
2603	7

DATE MAILED: 8/7/96

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents

Responsive to the proposed communication re the power of attorney filed 7/25/96.

The above communication, signed by Richard Fuller, has not been entered for the following reason.

Effective September 4, 1992, 37 CFR 3.73(b) requires the Assignee of the entire right, title and interest to establish ownership by submitting to the Office documentary evidence of a chain of title from the original owner to the assignee or by specifying (e.g. reel and frame number, etc.) where such documentary evidence is recorded. In addition, the assignee of a patent application or patent must submit a statement specifying that the evidentiary documents have been reviewed and certifying that, to the best of assignee's knowledge and belief, title is in the assignee seeking to take the action. See Federal Register on July 6, 1992 (Vol. 57, No. 129, 29634-29648), and in the Official Gazette on July 28, 1992.

Susan Bond

Verlene Green for
SAE, Group 2600
(703)305-4929

EXHIBIT C

429-202
539-203
55-215

2603

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicants: Eduardo J. Moura, et al.

Serial No.: 08/426,920 : Examiner S. Hom

Filed: April 21, 1995 : Art Unit:2603

For: Asymmetric Hybrid Access System and Method

Date: July 31, 1996

8/15/96

A M E N D M E N T

In reply to the Official Action mailed April 3, 1996, please amend the above-identified application as follows:

IN THE ABSTRACT

Please withdraw the original Abstract of the Disclosure on page 41, and substitute the new Abstract of the Disclosure, submitted herewith.

IN THE SPECIFICATION

Page 11, line 18, change "28" to --28'--.

Page 12, line 2, change "28" to --28'--;
line 12, change "5" to --26--;and
line 19, change "5" to --26-- .

Page 15, line 15, insert --a-- after "which";
insert --is-- after "or";
line 16, insert --,-- after "3c"; and
line 19, insert --the-- before "HAS".

OK refund 234.00
OK refund 143.00
JCC.

B

Page 19, line 18, insert --no-- before "application";
line 19, after "direction" insert --, the state is idle.--; and
line 20, after "message" insert --from a client--.

Page 21, line 14, change "allocation" to --available--.

Page 23, line 13, change "72a and 72b" (first occurrence) to --73a and 73b--.

Page 28, line 8, change "Mi" (first occurrence) to --Mi+1--.

Page 31, line 8, change "a" to --an--.

IN THE CLAIMS

Re-write claims 1, 5, 6, 15, 17, 19, 20, 24 and 25 as follows:

1. (Amended) A hybrid access system for [connecting] communication with at least a single data processor [with] in a network, said system comprising:

a local area network [(LAN) system] which includes a shared medium;

a hybrid system manager [connected to said LAN system] in communication with said local area network for transmitting information over said shared medium and for interactively handling transfers of information thereover in accordance with a high speed downstream channel protocol and transfers of lower speed return information in accordance with an upstream channel protocol;

a downstream router [connected to said LAN system] in communication with said local area network for transmitting information over said shared medium;

an upstream router [connected to said LAN system] in communication with said local area network for receiving information, ~~said upstream router including a Hybridware server,~~ Hybridware SM

a broadcast unit connected to said downstream router, said broadcast unit being capable of point-to-multipoint broadcast links on said local area network;

a downstream channel [connected to] in communication with said broadcast unit for high speed transmission [on a first medium on said high speed downstream channel] to said single data processor ~~at least a single data processor~~ in communication with said shared medium;

an independent upstream channel [connected to] in communication with said upstream router, for transmission of information from said data processor [which operates] at a lower speed than transmission of information on said downstream channel;

at least a single remote link adapter [connected to] associated with said data processor and being in communication with said upstream and downstream channels; and

[a corresponding] at least a single client data processor [connected to] in communication with said remote link adapter.

---

5. (Amended) The hybrid access system according to claim 1, wherein said [LAN system] local area network includes a

[LAN] switch and ~~at least one of a~~ downstream router and ~~an~~ upstream router.

Claim 6, line 3, change "or" to -and--.

~~18.~~ (Amended). [A] In a wide area network that includes a host server, a plurality of remote clients, a headend facility, a high speed interface that connects said headend facility with said host server, and a high speed link for transferring downstream data packets, a method of providing high speed remote access [of a wide area network] from any of a plurality of client processors each connected to ~~said asymmetric [hybrid] network~~ including high-speed downstream and lower-speed upstream channels controlled by a hybrid system manager and a router [server], said method including the steps of:

providing ~~a downstream channel~~ that is shared by said plurality of remote clients,

providing at least one independent upstream channel that enables at least one of said remote clients to transmit lower speed return data packets to said host server,

issuing an upstream channel authorization request by a lower speed channel for an upstream data channel currently used by a particular client data processor,

conducting login communications between the router [server] and the system manager,

verifying authorized user status at the system manager [level],

authorizing specific upstream channel use by high speed downstream channel message, and

sending upstream data over an allocated lower speed upstream channel of the asymmetric [hybrid access] network.

17. In a full-duplex asymmetric network communication system for transferring information between a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of ~~said downstream channel~~ the downstream channel, and wherein said network communication system includes a hybrid access system for providing interactive network sessions in downstream and upstream communication channels, a [A] method of transmitting data from an upstream transmit queue in an upstream transmitter node to a selected receiver node located at a receiving end, said method comprising the steps of:

transmitting selected amounts of packet data from ~~a transmit queue~~ a first transmit queue in a first node to a second node wherein said second node includes ~~a transmit queue~~ a second transmit queue for transmitting acknowledgments to a receiver node,

generating acknowledgments of packet data received by said second node,

eliminating from the second transmit queue of the second node packet data acknowledgments which are redundant of other packet data acknowledgments in said second transmit queue, and

filling open transmit queue spaces with additional packet data.

19. (Amended) In a full-duplex asymmetric network communication system for transferring information between a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of ~~said downstream channel~~ the downstream channel, and wherein said network communication system includes a hybrid access system for providing an interactive network session in downstream and upstream communication channels, a [A] method of dynamically setting remote link adapter power [level] levels in [a] said hybrid access system, comprising the steps of:

transmitting successive indications to a hybrid upstream router at selected different power levels,

confirming receipt of a [first power level indication] selected one of said indications,
and

setting [the] a level of future transmissions to a power level associated with [confirmation of receipt] the selected indication.

20. (Amended) In a full-duplex asymmetric network communication system for transferring information from a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said

shared medium and for transmitting lower speed return information over an upstream channel that is independent of ~~said downstream channel~~ the downstream channel, and wherein said network communication system includes a hybrid access system for providing an interactive network ~~sessions~~ session in downstream and upstream communication channels, a [A] method of packet suppression in communication between first and second nodes in said communication system having respective first and second transmit and receive queues, in which information packets having headers are transmitted from said first node to said second node, comprising the steps of:

loading [the transmit queue of said first node with] a first information packet into the transmit queue of said first node;

loading a second information packet into [a] the transmit queue of said first node;

checking the headers of said first and second information packets, and responsive to redundancy between ~~said first and second headers~~ the first and second headers, suppressing one of said first and second information packets [, if the headers are the same].

~~24.~~ 11. (Amended) In a full-duplex asymmetric network communication system for transferring information from a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of ~~said downstream channel~~ the downstream channel, and wherein said network communication system includes a hybrid access system for

simultaneously controlling the downstream and upstream in interactive network sessions, a [A] method of dynamically responding to detected quality levels in a communication channel, comprising the steps of:

detecting a quality characteristic with respect to a selected communication channel from a selected group of quality characteristics each of which is defined by quantitative levels,

determining whether the quantitative level of the detected quality characteristic deviates with respect to a predefined norm, and

dynamically switching to another communication channel, if sufficient deviation is determined.

12 11
25. (Amended) The method according to claim [25] 24 wherein said group of quality characteristics includes time from last operability indication, signal to noise ratio, and error frequency.

Insert new claims 26-74, as follows:

13
--28. A network communication system including a server, a plurality of remote clients and an information distribution facility for distributing information signals to said remote clients, said communication system comprising:

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote

clients to receive high speed data packets from said server over a shared medium,

at least one independent upstream channel for enabling at least one of said remote clients to transmit lower speed return data packets to said server,

a hybrid access system including a network manager for interactively controlling both transfers of data packets from said server to said remote clients via broadcasts over said shared downstream channel in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said server and said plurality of remote clients, and

said hybrid access system further includes a server interface that enables communication with said server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared media and an upstream router for receiving return data packets from said remote clients.

14 The
~~27. A~~ network communication system as recited in claim ~~26~~ 13 wherein said plurality of remote clients include remote link adapters and said downstream router couples said shared medium to establish a physical connection with said downstream channel and said upstream router couples said remote link adapters to establish a physical connection with said upstream channel.

15 The
~~28. A~~ network communication system as recited in claim ~~26~~ 13 wherein said independent upstream channel lies in a

communication medium that is different from said downstream channel.

16 ~~29.~~ The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein said shared medium comprises a hybrid fiber coaxial cable and said remote clients physically connect in parallel to said hybrid fiber coaxial cable to receive simultaneously broadcasted data packets whereby to facilitate efficient sharing of resources at said distribution facility by said remote clients.

17 ~~30.~~ The ~~A~~ network communication system as recited in claim ~~29~~ 16 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

18 ~~31.~~ The ~~A~~ network communication system as recited in claim ~~30~~ 17 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

19 ~~32.~~ The ~~A~~ network communication system as recited in claim ~~30~~ 17 wherein said at least one independent upstream channel comprises an independent lower speed channel transmitted over said hybrid fiber coaxial cable, and said upstream router receives said data packets transmitted by said at least one remote client over said independent upstream channel and routes said data packets to said server.

20 ~~33.~~ The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein said distribution facility comprises a cellular broadcast facility, said shared medium comprises radio frequency broadcasts from said cellular broadcast facility, and said remote clients each comprise radio frequency

receivers for substantially simultaneously receiving data packets transmitted over said shared medium so as to provide sharing of resources at said distribution facility by said remote clients.

d 21 ~~24.~~ The ~~A~~ network communication system as recited in claim ~~33~~ 20 wherein said at least one independent upstream channel comprises a lower speed cellular return channel routed through said distribution facility.

d 22 ~~25.~~ The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein said distribution facility comprises a satellite, said shared medium comprises a direct satellite broadcast and said remote clients includes a receiver for substantially simultaneously receiving information signals from said ~~br~~oadcast so as to provide sharing of broadcast resources among said remote clients.

d 23 ~~26.~~ The ~~A~~ network communication system as recited in claim ~~38~~ 22 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

d 24 ~~27.~~ The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein each of said upstream and downstream channels lies in a communication medium selected from one of a CATV distribution network, a cell site, a radio transmitter station, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

d 25 ~~28.~~ The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein said distribution facility comprises a television broadcast facility, said shared medium comprises radio frequency broadcasts from said television broadcast

44

facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium whereby to provide sharing of resources located at said distribution facility.

d 26 ~~39~~. The ~~A~~ network communication system as recited in claim ~~38~~ 25 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

d 27 ~~40~~. The ~~A~~ network communication system as recited in claim ~~39~~ 26 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

d 28 ~~41~~. The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein said distribution facility comprises a radio broadcast facility, said shared medium comprises radio frequency broadcasts from said radio broadcast facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium whereby to provide sharing of resources located at said distribution facility.

d 29 ~~42~~. The ~~A~~ network communication system as recited in claim ~~41~~ 28 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

d 30 ~~43~~. The ~~A~~ network communication system as recited in claim ~~42~~ 29 wherein said at least one independent upstream channel

comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

31. The network communication system as recited in claim 17 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

32. The network communication system as recited in claim 19 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

33. The network communication system as recited in claim 26 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel whereby to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

34. The network communication system as recited in claim 29 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to

demand by respective remote clients communicating with said shared medium.

35 ~~48~~. The ~~A~~ network communication system as recited in claim 24 ~~37~~ wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

36 ~~49~~. The ~~A~~ network communication system as recited in claim 13 ~~26~~ wherein said distribution facility comprises a television broadcast facility, said shared medium comprises radio frequency broadcasts from said television broadcast facility, ~~and~~ said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium so as to provide sharing of resources located at said distribution facility.

37 ~~50~~. The ~~A~~ network communication system as recited in claim 36 ~~49~~ wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

38 ~~51~~. The ~~A~~ network communication system as recited in claim 36 ~~49~~ wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

39 ~~52~~. In a split-channel asymmetric network communication system including a host server, a plurality of remote clients and a headend facility for distributing information

signals to said remote clients, a full-duplex packet delivery system comprising:

a downstream channel that is shared by said plurality of remote clients for receiving high speed data packets from said host server over a shared medium,

at least one independent upstream channel that enables at least one of said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol ~~and~~ for controlling transfers of lower speed return data packets from said at least one remote client to said host server over said independent upstream channel in accordance with an upstream channel protocol and in accordance with scheduling information transmitted on the downstream channel, said network manager being further operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients,

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared ~~medium~~ medium and an upstream router for receiving return data packets from said at least one of said remote clients,

whereby said network communication system provides full-duplex interactive asymmetric communication in a session between said host server and said plurality of remote clients over ~~a shared communication medium~~ said shared medium.

40 39
~~53~~. The invention as recited in claim ~~52~~ wherein said network manager schedules assignment of upstream channels for use by said at least one remote client in accordance with at least one of an upstream channel availability signal, a priority status signal, a shared/dedicated channel request signal, or a service level authorization signal.

41 39
~~54~~. The invention as recited in claim ~~52~~ wherein communication media for each of said downstream and said upstream channels is selected from at least one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

42 41
~~55~~. The invention as recited in claim ~~54~~ wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel.

43
~~56~~. A network communication system including a host, a plurality of remote users and an information distribution facility for distributing information signals to said remote users, said system comprising:

a downstream channel shared by said remote users for receiving digital information signals transmitted from the host over a shared medium at a high speed,

at least one independent upstream channel for permitting the remote users to transmit digital information to said host at a lower speed than the high speed on the downstream channel,

a hybrid access system for interactively controlling transfers of digital information from said host to the

remote users via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and for controlling transfers of digital information from said remote clients to said host at said lower speed over said at least one independent upstream channel in accordance with an upstream channel protocol, said hybrid access system being operable to provide full-duplex point-to-multipoint communication between said host and said remote users, and

said hybrid access system further including an interface for connecting with the host, a downstream router for enabling transmission of high speed information to said remote users over said shared medium and an upstream router for receiving return information from said remote users.

44 The
~~57. A~~ network communication system as recited in claim 43 ~~56~~ wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

45 The
~~58. A~~ network communication system as recited in claim 44 ~~57~~ wherein said upstream channel protocol enables operation of said upstream channel at multiple speed and said hybrid access system selectably controls speeds of data transfers on said upstream channel.

46
~~59.~~ A network communication system including a host server, a plurality of remote clients and a headend facility for distributing data packets to said remote clients, said system comprising:

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a downstream channel that is shared by said plurality of remote clients for receiving high speed data packets from said host server over a shared medium,

at least one independent upstream channel that permits said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol, and for controlling transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel located on a physical medium that is different from shared medium of said downstream channel, said upstream communication channel being assigned in accordance with an upstream channel protocol and scheduling information transmitted on the downstream channel, said network manager being further operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients,

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared ~~media~~ medium and an upstream router for receiving return data packets from said remote clients.

~~50~~ 47. The network communication system as recited in claim ~~39~~ 46 wherein said hybrid access system effects control of assignment of upstream channels to said remote clients in accordance with scheduling information including a dedicated

or shared channel request signal, a channel availability signal, a priority status signal or class of service signal.

48 The 47
61. ~~A~~ network communication system as recited in claim ~~60~~ wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

49 The 48
62. ~~A~~ network communication system as recited in claim ~~61~~ wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel.

50
63. A client-server system including a split-channel asymmetric network for enabling multiple users to share information, said system comprising:

a host server,

a plurality of remote users,

a distribution facility for distributing information signals to said remote users,

a downstream channel that is shared by said plurality of remote users so as to enable said plurality of users to receive high speed data packets from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote users to

transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system for interactively controlling both transfers of data packets from said host server to said remote users via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote users to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote users in an interactive session wherein transmission of upstream information is controlled, in part, by control information transmitted over said downstream channel, and

said hybrid access system further including a host interface that enables communication with said host server, a downstream router for enabling transmission of high speed data packets to said remote users over said shared medium and an upstream router for receiving return data packets from said remote users.

51. In combination with a multi-user computer system including at least one host computer and a plurality of remote clients, the improvement comprising:

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote clients to receive high speed data packets from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a speed that is lower than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for interactively controlling both transfers of data packets from said host server to said remote clients via broadcasts over said shared medium that communicates with said plurality of remote clients in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

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~~55~~. In combination with a CATV broadcast transmission facility including a shared medium downstream channel that is shared by a plurality of remote clients to receive high speed data packets from a host server, the improvement comprising:

respective RLA devices associated with said remote clients that are connected with said shared medium and tuned so as to receive high speed transfers of data packets for conveyance to said remote clients,

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at least one independent upstream channel that enables said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for interactively controlling both transfers of information data packets from said host server to said remote clients via broadcasts over said shared medium that communicates with said plurality of remote clients in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients in an interactive session wherein transmission of upstream information is monitored or controlled, in part, by control information transmitted through said downstream channel, and

said hybrid access system further including an interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared ~~media~~ medium and an upstream router for receiving return data packets from said remote clients,

whereby said improvement acts to provide full-duplex interactive asymmetric communication in a session between ~~a host server~~ said host server and said plurality of remote clients through ~~a network~~ said CATV broadcast transmission facility over ~~a shared communication medium~~ said shared medium.

53. ~~56.~~ The ~~A~~ network communication system as recited in claim ~~65~~ 52 wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV

distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

54 ~~67~~. The ~~A~~ network communication system as recited in claim 53 ~~66~~ wherein said upstream channel protocol enables operation of said upstream channel at multiple speed and said hybrid access system selectably controls speeds of data transfers on said upstream channel.

55 ~~68~~. In combination with a television signal broadcast facility, the improvement comprising:

a host computer,

a plurality of remote clients,

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to permit said plurality of remote clients to receive high speed data packets from the host server ~~said host server~~ over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared

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medium in accordance with a high speed downstream channel protocol and for receiving transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

56. In combination with a television signal broadcast facility, a network of host computers and a plurality of remote clients, the improvement comprising:

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote clients to receive high speed data packets from the host server ~~said host server~~ over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for controlling both transfers of data packets from said host server to said remote clients via broadcasts over said

shared medium in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

70. In an asymmetric network communication system including a host server and a plurality of remote clients wherein respective remote clients have associated remote link adapters that operate in accordance with predefined downstream and upstream protocols, said system including:

a headend facility that distributes information signals,

a downstream channel that is shared by said plurality of remote clients so as to permit said plurality of remote clients to receive high speed information signals from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel to enable at least one of said remote clients to transmit return information signals to said host server at a lower speed than said information signals transmitted over said downstream channel,

a hybrid access system for controlling transfers of information signals transmitted from said host server to said remote clients over said shared medium in accordance with said downstream protocol and for monitoring communication over said independent upstream channels thereby to provide interactive communication between said host server and at least one of said plurality of remote clients over said downstream and upstream communication channels, and

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed information to said remote clients over said shared media,

whereby said asymmetric network communication system provides ~~full~~-duplex interactive asymmetric communication between ~~a host server~~ said host server and said at least one of said plurality of remote clients in a shared medium environment.

58

~~11~~. A packet delivery system for use in an asymmetric network to provide full-duplex communication, said system including a host server and at least one remote client that has a remote link adapter operating in accordance with a high speed downstream and a lower speed upstream protocol, said packet delivery system comprising:

a downstream channel that is shared by said at least one remote client so as to enable said at least one remote client to receive high speed data packets from said host server over a shared medium,

at least one independent upstream channel that enables said remote client to transmit lower speed return data packets to said host server,

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a hybrid access system ~~including~~ for controlling transfers of data packets from said host server to said remote client over said shared medium in accordance with said downstream channel protocol and for monitoring communication over said independent upstream channel thereby to schedule upstream communication in accordance with predefined rules, and

said hybrid access system further including an interface that enables connection with said host server and a downstream router for enabling transmission of high speed ~~atq~~ data packets to said remote client over said shared media.

59. The ~~A~~ packet delivery system as recited in claim ~~71~~ 58 wherein said hybrid access system effects control of assignment of upstream channels to said remote client so as to assign either a shared channel or dedicated channel to a remote client.

60. The ~~A~~ packet delivery system as recited in claim ~~72~~ 59 wherein said hybrid access system effects switching of channel assignments among said remote client between shared and dedicated upstream channels.

~~74~~ 61. The method as recited in claim ~~15~~ 7 further including the step of providing said independent upstream channel on a medium different from a physical medium of said downstream channel.--

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REMARKS

Claims 1-6, 15, 17, 19-20 and 24-25 remain in the application for reconsideration. New claims 26-74 are being added for additional consideration. Applicants' counsel has

exercised care so as to avoid the introduction of new matter in contravention of 35 U.S.C.§132.

Informalities

Regarding the information disclosure statement, applicants hereby provide copies of missing references;

USP 4,894,789 to Yee
USP 4,987,486 to Johnson et al.
USP 5,014,125 to Pocock et al.
USP 50051,822 to Rhodes
USP 5,093,718 to Hoarty et al.

In terms of relevance to the claimed subject matter, the above references disclose video-on-demand systems, or the like, which do not teach the combination of elements claimed in this application, and in respect of particular claims, the above references do not disclose a hybrid access system or network manager that establishes and manages network sessions for transmitting packetized data and the like over asymmetric forward and return channels operating at different speeds. In addition, none of the above references appears more relevant than the art cited and applied by the examiner.

A PTO form 1449 listing these references is attached.

We have also reviewed the lengthy specification and have corrected minor typographical errors, as requested.

A supplemental declaration is also attached to address the examiner's objections to the initialed interlineations appearing in the original application (Fig. 7 and claim 1) and to address the amended and new claims introduced herein.

Regarding the suggested Sec. 112, second paragraph, discussion of claims 1, 5, 17 and 19, we've made certain amendments touching the examiner's concerns. We also made other changes in an effort to particularly point out and clearly define the invention over the art.

Rejection Under 35 U.S.C. §102(b)

Substantively, the examiner has rejected claims 17, 19, 20 and 24-25 under 35 U.S.C. Sec. 102(b) as being unpatentable over McMullan, Jr. et al. As discussed herein, we traverse this rejection on the basis of certain amendments to the claims and for reason that McMullan Jr., et al. (hereafter "McMullan") does not exactly disclose "each and every" element or the technical substance of the claims as they previously stood and as currently amended. We explain below.

There appears to be a fundamental mistake as to what McMullan shows. For a reference to become statutory under Sec. 102, it must disclose "each and every" element of the claimed invention. Otherwise, it can only be applied under Sec. 103. Clearly absent from McMullan, even before making any amendment, is the provision of an acknowledgment queue located at a "transmitting node" of the network. Instead, McMullan deals with multiple message queues located at a "receiver node" that are simultaneously routed to message queues also located at the receiver node. It is stated in the Official Action, for example, that McMullan recites "the message queue for buffering the data packets for transmission to a system manager and filtering out prior transmission to the system manager by matching address and discarding duplicate data . . ." Perhaps it was not clear that the invention, as claimed, places the acknowledgment queue at a transmitting node. This is clearly different from what McMullan discloses. For this reason, among

others, McMullan does not show the same kind of redundancy filtering that is performed by the claimed invention.

Further, there is another distinction that disqualifies McMullan as a reference under Sec. 102. McMullan does not, for example, discard redundant "information" packets. Instead, he discards information that is duplicative of other information which a device has previously sent to a message queue. This is clearly different from suppressing the transmission of redundant packets about to be transmitted a transmit queue, as claimed. For instance, at col. 29, line 49, of McMullan it is stated that if "a matching terminal address is found, then the duplicate [information] will be discarded." The "terminal address" here refers to the address in the queue associated with the device. McMullan, at col. 30, line 1, further indicates that device information is formed into packets and then forwarded to a "system manager." All of this activity occurs at the receiving end of the system--and not in preparation of transmission of non-redundant data packets. Thus it is abundantly clear by the description at col. 30, lines 8-16, that McMullan simply provides for removal of packets at the receiving end after receipt of an acknowledgment, and not the removal of a redundant contained in a transmit queue.

Quite distinctively, the present invention deals with suppression (removal) of messages at a transmit queue prior to their being actually transmitted. Queuing the packets (or acknowledgments) prior to transmission introduces some latency in the transmission path but overall throughput is improved in noisy channels. In operation, information contained an acknowledgment received at the transmitting end is analyzed to determine whether the content of a soon-to-be-transmitted packet was earlier received or acknowledged. This is evident when operating in TCP/IP sessions where the present invention accounts for sequence numbers to assess redundancy in data packets since new acknowledgments that

contain additional information that may supersede prior acknowledgments. If the content was already acknowledged, the packet (or acknowledgment) is suppressed to make room for other packets to enter the transmit queue. This scheme is not shown or taught by McMullan.

Although the examiner has also applied McMullan to claim 19, we find nothing in McMullan and the examiner has pointed to no specific disclosure therein, as required by 37 CFR 1.106(b), pertaining to the deployment of a power calibration scheme in an interactive network environment. In addition, we do not find disclosure of successive "transmission of . . . different power levels," "confirming of receipt of [power level] indications," or "setting . . . of power levels," as recited in the claims. Also, no routers are disclosed in McMullan. In contrast with the claim language, the power calibration techniques set forth at cols. 45-46 of McMullan are "manually" initiated, rather than being "dynamically" performed, as recited in claim 19. For these reasons, and others, McMullan is clearly inadequate as an anticipatory reference under 35 U.S.C. Sec. 102(b). Accordingly, the rejection must be withdrawn.

We also assert that McMullan cannot properly be applied to claim 24 or 25 under 35 U.S.C. Sec. 102(b). Apart from the lack of deployment in McMullan of an interactive network session, as suggested in the patent claims, there is further no showing of "detecting a quality characteristic," determining whether the . . . detected quality characteristic deviates" or "dynamically switching to another communication channel" based on a detected quality characteristic (e.g., feedback control). McMullan, on the other hand, simply describes pre-programmed clock switching of channels at selected times, e.g., 6:00 p.m. and 4:00 a.m., is not responsive to a detected "quality characteristic." In other words, McMullan's "power management" scheme is static and calibration occurs under

operator control, rather than being dynamically and automatically performed. Claim 24 further supports these distinctions by calling for switching based on "last operability indication," "signal to noise ratio" and "error frequency."

The invention defined by claim 17 and 19 operates in full-duplex mode using protocols with dynamic, real-time feedback mechanisms. No comparable operation is found in McMullan. We note that the McMullan system has little, if any, need to provide real-time interactive session-type network connectivity since it simply responds by fulfilling "orders" given by a remote terminal to download a file.

To summarize generally, with respect to the elements of the claims, McMullan does not anticipate the invention, as required under Sec. 102(b), because it lacks one or more of the features: (i) asymmetric communications, (ii) dynamic or automatic switching of channels based on power levels or quality characteristics, (iii) full-duplex interactive session-type network connectivity with remote user by simultaneous control of downstream and upstream communications and (iv) receiving acknowledgments at the transmit queue.

Rejection Under 35 U.S.C. §103

The examiner has rejected claims 1-6 and 15 under 35 U.S.C. Sec. 103 as being unpatentable over Litteral et al. ("Litteral") in view of Wheeler et al. ("Wheeler"). In summary, this rejection should also be withdrawn because the combined disclosures of Litteral and Wheeler with respect to recited elements of claims 1-6, 15 and new claims 26-74 do not teach or suggest (i) use of a "shared medium" between a distribution facility (headend or central office) adapted for point-to-multipoint communication between a host and multiple clients/users in conjunction with a network manager

or hybrid access system to manage or assign channels or bandwidth in order to provide efficient user of resources to support a greater number of users (this differs from the point-to-point architecture of ADSL networks where multiple users are reached by multiplexing (Litteral, Fig. 1),(ii) use of an "independent" asymmetric upstream channel that is "loosely" coupled with or controlled by the high speed downstream channel, such as by assignment of different protocols or packet data rates by a hybrid access system or a network manager (this is critical to attaining efficient use of the upstream channel), (iii) providing selectable control of speed on the lower speed return (upstream) channel to afford efficient use of bandwidth according to bandwidth demand and data type (e.g., text, audio, video) (this aspect particularly relates to claims 30, 32, 39, 42 and 44-47, where the upstream return channel is routed back to a headend facility for subsequent routing to the server), (iv) use of a hybrid access system or network manager to establish interactive session-type (real time, two-way) network communication between a host and a client/user (e.g., providing loose coupling between downstream and upstream channels to manage the flow of information in each direction based on user or server requests rather than just providing "ordering data" as described at col. 6 of Litteral), (v) use of a network manager or a hybrid access system for scheduling assignment of an upstream channel to a remote client/user in accordance with scheduling information including priority status, shared/dedicated channel request signal, service authorization or the like, (vi) use of different physical media (cable or wireless optical, electrical, electromagnetic, etc.) for upstream and downstream channels, or (vii) other features, aspects and advantages provided by the combination of these features.

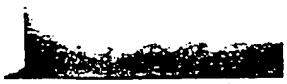
As indicated above, the initial application claims have been amended to recite important distinctive features which succinctly point out and clearly define the invention over

the applied art. A major difference between the invention, as now claimed, and any combined teachings of Litteral and Wheeler lies in nature of the network interconnecting the host and the remote clients. The "shared medium" (e.g., LAN system) of the claimed invention provides point-to-multipoint distribution of information to remote clients whereas Litteral discloses an ADSL network, which has a point-to-point architecture.

As described below, the claimed differences provide other structural and operational differences which are reflected in the primary independent claims, as well as, in multiple dependent claims for which patentability stands alone.

Utilization of the claimed point-to-multipoint "shared medium" architecture, for example, is critical to attaining efficient utilization of system resources (e.g., substantial increases in the number of users for a given amount of hardware), attaining reliable information transfers by providing alternative routes (e.g., alternate switching of clients among different logical channels on the same shared (e.g., common) medium), improving tolerance to noise and other disturbances, providing multiple speeds of operation on the upstream channel when managed by a signal transmitted over the common medium, providing modular growth and scalability with minimum incremental equipment costs, affording flexible control of upstream traffic through various classes of service or client bandwidth demand, enabling the use of bandwidth of other idle client devices connect to the shared medium, and more. These aspects of the present invention cannot readily be attained using the point-to-point ADSL architecture of Litteral (Wheeler was cited only for its disclosure of routers).

Litteral describes a "video-on-demand" system enabling a user to "order" video programming by issuing requests over



"local loop" of a PSTN or dedicated ISDN network and receiving video information from a video provider over an ADSL network. (Col. 6, lines 3-14). Litteral's improvement relates to providing real-time control of video programming (col. 4, lines 30-34) and use of a video storage buffer 42 (Fig. 2) to provide VCR-type control of video (e.g., pause, slow motion, forward, reverse, etc. by the subscriber (col. 5, line 28-35, col. 11, lines 1-8). A "packet data network" is even suggested as a means for carrying order data (col. 6, lines 18, 35) and the subscriber local loop may include "a standard tip and ring telephone pair, a fiber optic cable or a coaxial cable" (col. 6, lines 29-30). The kind of video control includes scheduling data transmitted from the subscriber to the central office via telephone (col. 5, line 21). Wheeler, although cited for its disclosure of routers, discloses a share "platform" as opposed to a shared medium that distributes information via telephone lines (col. 5, lines 32-35). Connectivity between the central server and end users is established via the routers mentioned by the examiner. See col. 6, lines 23-35. Devices within the Wheeler system connect via a conventional LAN network.

As known in the art, systems like Litteral are not "interactive" in the real-time sense. A user simply "orders" a selection via a low speed channel, e.g., via telephone, and a video archive simply sends the information via a high speed channel. While this mechanism is asymmetric, the two-way communication is not conducted in a real-time session where a network manager or hybrid access system manages or coordinates upstream and downstream transmissions in terms of channel assignments, service level authorizations, switching between shared and dedicated channels, fulfillment of channel requests and the like. Litteral alludes to a "network session" at col. 7, line 61-62 (placed in quotes) but his system obviously is not conducted in a manner where interactive communication is

managed by a network manager or the like. In each direction of the Litteral's purported "session," respective communication paths, although asymmetric, are completely independent from each other lacking any intervention or supervision by a network manager, as claimed, to establish and maintain a user session with a server, as claimed, and do not occur over a shared medium. Even the upstream channel of Litteral's remote control unit 130 connection with the ADSL network (Fig. 2, col. 11, lines 1-8) fails to disclose any control by a network manager as discussed above. Important to distinguishing the claimed invention over the art is that Litteral transmits all upstream control data and all downstream video information on a dedicated loop between the subscriber and the central office. In other words, there is no "shared medium" in Litteral's path between the subscriber and central office.

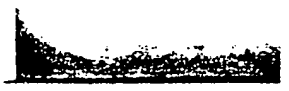
It is stated at page 7 of the examiner's comments that Fig. 2 of Litteral shows a "network management system" that "anticipate[s] the system manager connected to the LAN." We believe that use of the term "anticipate" is inappropriate here since the analysis is to be conducted under Sec. 103, and not Sec. 102. Nevertheless, Litteral's purported network management system 28 fails to attain items (ii), (iii), (iv), (v) and (vi) mentioned above since, among other things, Litteral's ADSL network has a point-to-point architecture, e.g., has a spoke and hub configuration. Each use has a dedicated line to the central office. In fact, any suggestion that Wheeler's routers may be combined with Litteral point-to-point system seems a bit ambiguous since Litteral's connection is via dial-up on a dedicated line thereby obviating the need for a routing function. Use of dedicated line cannot motivate or suggest the use of routers. They are conflicting rather than supplementary thereby defeating the legal basis for *prima facie* obviousness. See §2143.01, MPEP.

Equally ambiguous is the reference to the Litteral's satellite dish of Fig. 1 as a teaching of "broadcasting" stated at page 7 of the examiner's comments. Is Litteral concerned with satellite broadcasting or was placement of satellite dish in drawing figure merely "window dressing?" No client devices in the Litteral system seem to be communicating over a shared satellite broadcast signal.

We also fail to see the relevance of the infrared remote control mentioned at page 7 of the examiner's comments to management of sessions, channel assignment and the like over a shared medium since the infrared remote control is also point-to-point and limited to one device at a time.

Further, Litteral's Network Manager 28 appears to be employed to control the digital cross-connect switch 24 for establishing the point-to-point connections by multiplexing. On the other hand, the point-to-multipoint architecture of the shared or common medium of the claimed invention enables broadcasts to, addressing of and management of multiple clients connect "in parallel" to a common medium whereby to achieve the critical advantages stated above.

In view of the above, we believe that it is readily apparent that Wheeler cannot be combined with Litteral to support an obviousness-type rejection under Sec. 35 U.S.C. 103. Considering what was to be achieved by the invention, as stated in items (i) through (vi) above, we hardly doubt that that combination alone, (e.g., ADSL technology and router technology) would have been of any benefit in leading a person of "ordinary" skill to achieve the recited structural and functional attributes of the invention, as defined by the present claims. In considering the invention as a whole (as required by Sec. 103), no grounds of obviousness can be supported on the basis of the applied art.



We also considered the other cited art and reached the same conclusion.

On the basis of the foregoing, reconsideration and early allowance is respectfully requested. Applicants' counsel stands ready to assist the examiner in resolving any issue regarding the claim language by telephonic or personal interview.

A request for an automatic one-month extension of time is hereby requested. Please charge any excess fees in connection with this response not otherwise provided upon submission to Cushman Darby & Cushman deposit account no. 03-3975 to the order of 7225/217537.

Respectfully submitted,

CUSHMAN DARBY & CUSHMAN

Timothy Loomis, Reg. No. 37,383
Lawrence Harbin, Reg. No. 27,644
Cushman Darby & Cushman
1100 New York Avenue, Suite 900
Washington, D.C. 20005-3918
(202) 861-3716 (202) 861-3000

IN THE UNITE ` STATES PATENT AND TRADEMAI`` OFFICE

PATENT APPLICATION

re PATENT APPLICATION of
Inventor(s): MOURA et al.

08/	426,920
Series Code †	Serial No. †

Filed: April 21, 1995

ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

Group Art Unit: 2603
Examiner: S. Hom

Atty. Dkt.	217537	1572
	M#	Client Ref

(Our Deposit Account No. 03-3975)

(Our Order No.	7225	217537
	C#	M#

Date: Monday, August 5, 1996
(Saturday, August 3, 1996)

Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

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96 AUG 12 PM 3:00
GROUP 260

RESPONSE/AMENDMENT/LETTER

This is a response/amendment/letter in the above-identified application and includes the herewith attachment of same date and subject which is incorporated hereinto by reference and the signature below is to be treated as the signature to the attachment in absence of a signature thereto.

FEE REQUIREMENTS FOR CLAIMS AS AMENDED

1. "Small Entity" statement(s) filed
   - [XX] previously
   - [ ] herewith (No.)

	Claims remaining after amendment	Highest number previously paid for		Present Extra	Large/Small Entity	Additional Fee	Fee Code
2. Total Effective Claims	* 74	**minus	25 =	49	x $22/$11 =	+ 539.00	103/203
3. Independent Claims	* 2517	***minus	12 =	11	x $78/$39 =	+ 429.00	102/202
4. If amendment enters proper multiple dependent claim(s) into this application for first time (leave blank if this is a reissue application) ..... add					+$250/$125=	+ 0	104/204
5. Original due date: July 3, 1996		NONE					
6. Petition is hereby made to extend the original due date to cover the date this response is filed for which the requisite fee is attached		(1 mo) $110/$55 = (2mos) $380/$190= (3mos) $900/$450=			+ 55.00		115/215 116/216 117/217
7. Enter any previous extension fee paid since above original due date (item 5) and subtract					-		
8.					Extension Fee Attached	+ 55.00	
9. If Terminal Disclaimer attached, add Rule 20(d) official fee					+ $110/$55=	+ 0	148/248
10. If IDS attached requires Official Fee, ... add or if Rule 97(d) Petition, ... add					+ $220 = + $130 =	+ 0	126 122
11. After-Final Request Fee per Rules 129(a) and 17(r)					+ $750/375=	+ 0	146/246
12. No. of additional inventions for examination per Rule 129(b):					x$750/375ea=	+ 0	149/249
13. Petition fee for						+ 0	
14.					TOTAL FEE ENCLOSED =	$ 1,023.00	

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Query: Is appeal deadline now? If so, file Notice of Appeal separately.

CUSHMAN DARBY & CUSHMAN, L.L.P.

1100 New York Avenue, N.W.
Ninth Floor, East Tower
Washington, D.C. 20005-3918
Tel: (202) 861-3000
Atty/Sec: LH:wyk

By: Atty: **Lawrence Harbin** Reg. No. **27,644**

Sig:

Fax: (202) 822-0944
Tel: **(202) 861-3716**

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CDC-120 10/95 d

Patent and Trademark Office

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

MAIL ROOM AUG 5 1996 PAT. & TRADEMARK OFF.

#9

Dkt. No.

Applicant: Moura, et al.

Appln. No.: 08/426,920

Filing Date: April 21, 1995

Examiner: S. Hom

Group Art Unit: 2603

Date: July 31, 1996 Page 1 of

U.S. PATENT DOCUMENTS

Examiner's Initials*		Document Number	Date MM/YYYY	Name (Family Name of First Inventor)	Class	SubClass	Filing Date (if appropriate)
SH	AR	4,894,789	1/16/90	Yee	364	521	2/22/88
	BR	5,093,718	3/3/92	Hoarty et al.	358	84	9/28/90
	CR	5,051,822	9/24/91	Rhoades	358	86	10/19/89
	DR	4,987,486	1/22/91	Johnson et al.	358	86	12/23/88
	ER	5,014,125	5/7/91	Pocock et al.	358	86	5/5/89
	FR						
	GR						
	HR						
	IR						
	JR						
	KR						
	LR						
	MR						
	NR						

FOREIGN PATENT DOCUMENTS

		Document Number	Date MM/YYYY	Country	Inventor Name	Class	SubClass	English Abstract Enclosed	English Abstract No	Translation Readily Available Enclosed	Translation Readily Available No
	OR										
	PR										
	QR										
	RR										
	SR										
	TR										
	UR										
	VR										
	WR										
	XR										

OTHER (Including in this order Author, Title, Periodical Name, Date, Pertinent Pages, etc.)

	YR										
	ZR										
	AAR										
	BBR										
	CCR										
	DDR										

Examiner S. Hom Date Considered: 8-21-96

*EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP § 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to Applicant

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION of

Applicants: Eduardo J. Moura, et al Group Art Unit: 2603

Serial No.: 08/426,920 Examiner: S. Hom

Filed: April 21, 1995

For: Asymmetric Hybrid Access System and Method

August 16, 1996

* * * *

AMENDMENT

Honorable Commissioner of Patents
& Trademarks
Washington, D.C, 20231

Sir,

Please amend this application as follows:

IN THE SPECIFICATION

Page 9, line 1, change "third" to --fourth--;
line 3, change "first and second" to --second and third--;
line 4, change "second and third nodes is" to --first and second and the third and fourth nodes are--.

Page 11, line 15, change "20" to --20'--.

Page 15, line 14, change "Figure" to --Figures--;
line 19, change "5" to --26--;
line 21, change "5" to --26--; and
line 23, change "Figure" to --Figures--.

Page 24, line 9, change "relays" to --delays--;
line 14, change "searching" to --SEARCHING--; change "stable" to --STABLE--;

line 15, change "In stable" to --In the STABLE--;
line 17, change "searching" to --SEARCHING--;
line 18, change "searching" to --SEARCHING--; and
line 21, change "a stable" to --the STABLE--.

Page 25, line 23, change "prior" to --subsequent--.

Page 28, line 6, change "last" to --next--.

Page 29, line 11, after "to a" insert --single--; and
line 12, after "ten packets," insert --at a selected frequency F--.

Page 30, line 10, after "state" insert --(NON_RESP)--;
line 20, insert --F-- after "frequency"; and
line 23, insert --F-- after "frequency".

Page 31, line 16, after "credit indication" insert --code D indicating a dedicated channel at frequency F--.

C2

REMARKS

Reconsideration and allowance of this application are respectfully requested.

By this amendment, the specification is amended to correct minor typographical and grammatical errors. No new matter is added by this amendment.

62

Applicants respectfully submit that this application is in condition for allowance, and an early Action allowing the claims is solicited.

Respectfully submitted,
CUSHMAN DARBY & CUSHMAN, L.L.P.

By: _____
Lawrence Harbin
Reg. No. 27,644

1100 New York Avenue, Suite 900
Washington, D.C. 20005-3918
Tel: (202) 861-3000
Fax: (202) 861-3716
217537

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION

PATENT APPLICATION of
Inventor(s): MOURA et al.
Appln. No.: 08 | 426,920
Series Code † | Serial No. †
Filed: April 21, 1995
Title: ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

Group Art Unit: 2603
Examiner: S. Hom
Atty. Dkt. 217537 | Client Ref
M# | Client Ref
(Our Deposit Account No. 03-3975)
(Our Order No. 7225 | 217537
C# | M#

Date: August 16, 1996

Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

RESPONSE/AMENDMENT/LETTER

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   - [x] previously
   - [ ] herewith (No.)

	Claims remaining after amendment	Highest number previously paid for		Present Extra	Large/Small Entity	Additional Fee	Fee Code
2. Total Effective Claims	* 74	**minus	74 =	0	x $22/$11 =	+ -0-	103/203
3. Independent Claims	* 23	***minus	23 =	0	x $78/$39 =	+	102/202
4. If amendment enters proper multiple dependent claim(s) into this application for first time (leave blank if this is a reissue application) ..... add					+$250/$125=	+	104/204
5. Original due date:		X	NONE				
6. Petition is hereby made to extend the original due date to cover the date this response is filed for which the requisite fee is attached		(1 mo) $110/$55 = (2mos) $380/$190= (3mos) $900/$450=			+		115/215 116/216 117/217
7. Enter any previous extension fee paid since above original due date (item 5) and subtract					-		
8.					Extension Fee Attached	+	
9. If Terminal Disclaimer attached, add Rule 20(d) official fee					+ $110/$55=	+	148/248
10. If IDS attached requires Official Fee; ..... add or if Rule 97(d) Petition, ... add					+ $220 = + $130 =	+	126 122
11. After-Final Request Fee per Rules 129(a) and 17(r)					+ $750/375=	+	146/246
12. No. of additional inventions for examination per Rule 129(b):					x$750/375ea=	+	149/249
13. Petition fee for						+	
14.					TOTAL FEE ENCLOSED =		$-0-

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CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficiencies only) now or hereafter relative to this application and the resulting Official Document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown in the heading hereof, for which purpose a duplicate copy of this sheet is attached.
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CUSHMAN DARBY & CUSHMAN, L.L.P.

1100 New York Avenue, N.W.
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By: Atty: Lawrence Harbin Reg. No. 27,644
Sig:
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Tel: (202) 861-3716

NOTE: File this cover sheet in duplicate with PTO receipt (CDC-103A) and attachments

CDC-120 10/96 d

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION

In re PATENT APPLICATION of
Inventor(s): MOURA et al.
Appln. No.: 08 | 426,920
Series Code † | Serial No. †

Group Art Unit: 2603
Examiner: S. Hom
Atty. Dkt. 217537 | M#

Client Ref

Filed: April 21, 1995
Title: ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

(Our Deposit Account No. 03-3975)
(Our Order No. 7225 | C# 217537 | M#

Date: August 16, 1996

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and Trademarks
Washington, D.C. 20231

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12. No. of additional inventions for examination per Rule 129(b):					x$750/375ea=	+	149/249
13. Petition fee for						+	
14. TOTAL FEE ENCLOSED =						$-0-	

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This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal sheet is filed.

Query: Is appeal deadline now? If so, file Notice of Appeal separately.

CUSHMAN DARBY & CUSHMAN, LLP.

1100 New York Avenue, N.W.
Ninth Floor, East Tower
Washington, D.C. 20005-3918
Tel: (202) 861-3000
Atty/Sec: LH:er

By: Atty: Lawrence Harbin Reg. No. 27,644
Sig:
Fax: (202) 822-0944
Tel: **(202) 861-3716**

NOTE: File this cover sheet in duplicate with PTO receipt (CDC-103A) and attachments

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Use 2 postcards for all New Applns. (Cont/Div/CIP, too)

Appln. No: 08/426,920	Attny: LH
First Inventor: MOURA et al.	Date: August 16, 1996
	Matter No: 217537
	Client No: 7225

ENCLOSED:

[X] Response/Amendment [X] Cover Sheet [ ] Cited/Listed Documents

[ ] Completion Request for R 53(d)/60(d)/62(d)/PCT Nat.

[ ] No. of Pages Abstract

[ ] No. of Pages Spec and Claims

[ ] No. of Numbered Claims Only

[ ] No. of Sheets of Drawings (Figs [ ])

[ ] 1 Set Formal [ ] 1 Set Informal [ ] Cover Letter

[ ] Declaration [ ] # of pages

[ ] Assignment [ ] Cover Sheet

[ ] Small Entity Declaration

[ ] Extension Petition (CDC-111)

[ ] No. of Priority Documents

[ ] IDS including PTO-1449

[ ] Cited Documents [ ] Search Report

[ ] Issue Fee Transmittal Form PTOL-85(b) + (c)

$ [-0-] Fee (Check)

OTHER: [DRAWING CHANGE AUTHORIZATION REQUEST]

Current DUE DATE: [None]

(Submit Single Copy Only)

CDC-103A 8/95 d

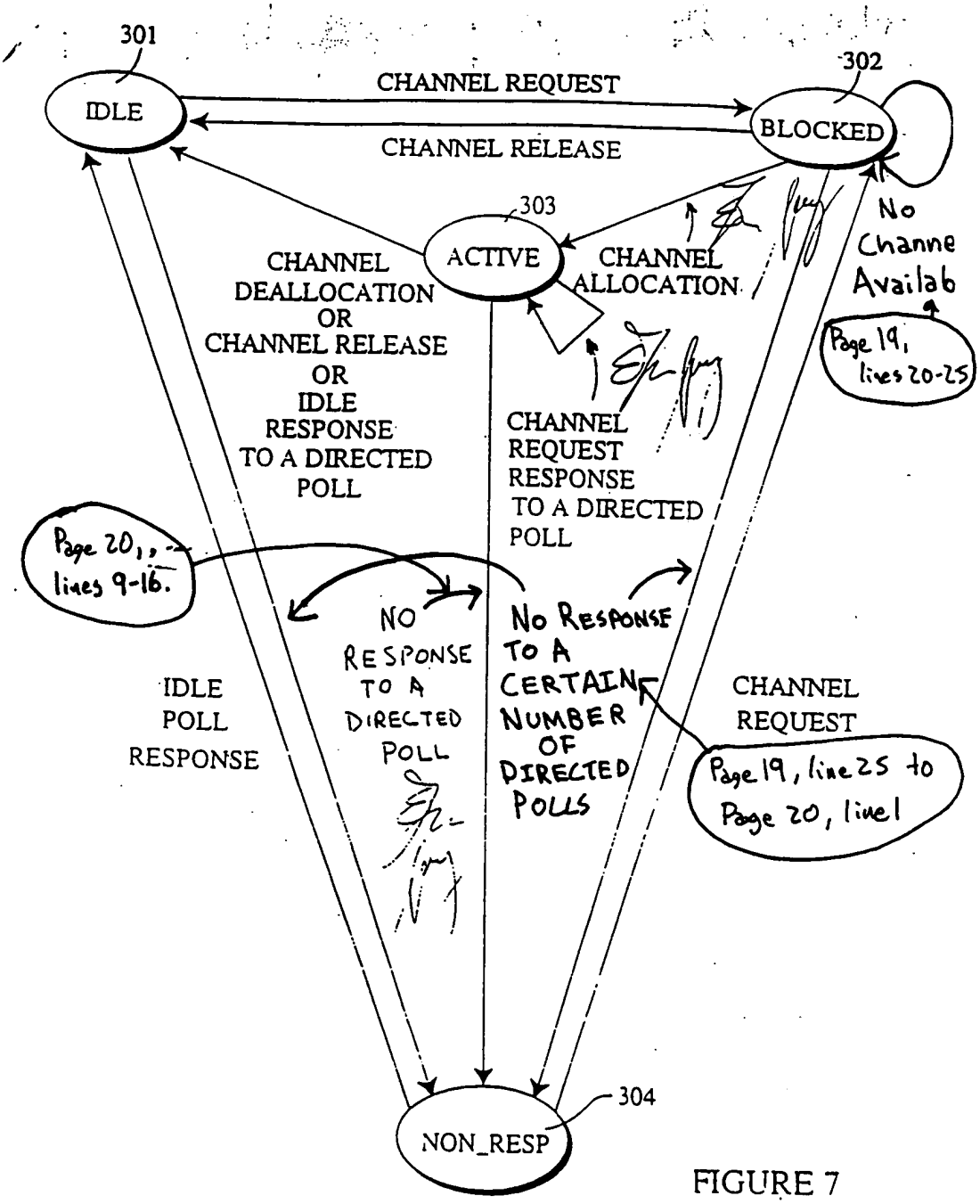
301
IDLE
CHANNEL REQUEST
CHANNEL RELEASE
302
BLOCKED
303
ACTIVE
CHANNEL DEALLOCATION OR CHANNEL RELEASE OR IDLE RESPONSE TO A DIRECTED POLL
CHANNEL ALLOCATION
CHANNEL REQUEST RESPONSE TO A DIRECTED POLL
No Channe Availab
Page 19, lines 20-25
Page 20, lines 9-16.
IDLE POLL RESPONSE
NO RESPONSE TO A DIRECTED POLL
No Response to a certain Number of directed polls
CHANNEL REQUEST
Page 19, line 25 to Page 20, line 1
304
NON_RESP

FIGURE 7

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKETT NO.

EXAMINER	
ART UNIT	PAPER NUMBER
	10

DATE MAILED:

EXAMINER INTERVIEW SUMMARY RECORD

All participants (applicant, applicant's representative, PTO personnel):

(1) Attorney Lawrence Harbin (3) Examiner Shick Hom

(2) SPE Douglas Olms (4)

Date of Interview 8-16-96

Type: ☐ Telephonic ☒ Personal (copy is given to ☐ applicant ☒ applicant's representative).

Exhibit shown or demonstration conducted: ☐ Yes ☒ No. If yes, brief description:

Agreement ☒ was reached with respect to some or all of the claims in question. ☒ was not reached.

Claims discussed: 1-74

Identification of prior art discussed: Litteral et al, McMullan, Jr et al. Wheeler

Description of the general nature of what was agreed to if an agreement was reached, or any other comments: Discuss difference & video-on-demand & ADSL technology, withdrawing claims 17, 19, 20, 24-25 in favor of divisional application, delete trademark term in claim 1. Applicant presented statement on Article 19.

(A fuller description, if necessary, and a copy of the amendments, if available, which the examiner agreed would render the claims allowable must be attached. Also, where no copy of the amendments which would render the claims allowable is available, a summary thereof must be attached.)

☒ 1. It is not necessary for applicant to provide a separate record of the substance of the interview.

Unless the paragraph below has been checked to indicate to the contrary, A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION IS NOT WAIVED AND MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW (e.g., items 1-7 on the reverse side of this form). If a response to the last Office action has already been filed, then applicant is given one month from this interview date to provide a statement of the substance of the interview.

☐ 2. Since the examiner's interview summary above (including any attachments) reflects a complete response to each of the objections, rejections and requirements that may be present in the last Office action, and since the claims are now allowable, this completed form is considered to fulfill the response requirements of the last Office action. Applicant is not relieved from providing a separate record of the substance of the interview unless box 1 above is also checked.

Shick Hom
Examiner's Signature

PTOL-413 (REV. 2-93)

ORIGINAL FOR INSERTION IN RIGHT HAND FLAP OF FILE WRAPPER

H0000172

Statement Under Article 19(1)

New claims 1-21 better define the invention over prior art references of Litteral et al. and Wheeler et al. In particular, the new claims characterize the invention as including a network manager (e.g., hybrid access system) that utilizes a point-to-multipoint shared medium architecture over which a host server communicates with a plurality of remote clients in an asymmetric and interactive communication network. This differs from the point-to-point ADSL bridge architecture (e.g., hub and spoke structure) of Litteral et al. that requires dedicated links between the ADSL bridge and each remote client. Alternatively, a "shared media" system permits multiple users to share common headend resources through a "parallel" or over-the-air coupling. It is noted that Wheeler et al. disclose a medium that is locally shared (e.g., a conventional LAN), as opposed to a host-to-remote shared medium, but even Wheeler et al.'s medium lacks both asymmetry operation and a network manager having the claimed structure to provide the claimed functionality.

Specific functionality provided by the shared medium architecture enables a network manager to provide more efficient sharing of resources and scalability in number of clients, interactive management of downstream and upstream data flow, switching between shared and dedicated logical upstream channels to better match bandwidth demand, assignment of optimum speeds of upstream data rate to respective clients (e.g, bandwidth on demand) based on available upstream bandwidth, as well as, other advantages. Such shared medium architecture for providing split-channel asymmetric interactive full-duplex communication in which remote clients essentially are connected in parallel is not disclosed in any of the cited references.

Apart from differences mentioned above, new claims 22-26 define other features of the invention over McMullan et al. In particular, McMullan et al. fail to show a transmit queue at that transmitting end which enqueues data packets (or acknowledgments) from which redundant packets (or acknowledgments) about to be transmitted are removed from the transmit queue before they are actually transmitted in accordance with acknowledgments received from a transmitter located at a receiving end. McMullan et al. merely show suppression operations at a receiving end and not interactivity between a transmitting and receiving end to remove redundancy of information in a transmit queue. Also, McMullan et al. do not show use of such suppression techniques in a shared medium point-to-multipoint environment as provided by the new claims. Aside from the absence of an interactive network McMullan et al. also do not show "dynamic" calibration of power based on "successive" transmission of different power levels as recited in new claim 23. Instead, McMullan et al. show "manual" power calibration. Further, McMullan et al. do not disclose feedback control of power or other parameters based on a quality characteristic such as a "last operability indication", "signal-to-noise ratio" or "error frequency" as recited in claim 26.

#11

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION of

Applicants: Eduardo J. Moura, et al Group Art Unit: 2603

Appln. No. 08/426,920 Examiner: S. Hom

Filed: April 21, 1995

For: Asymmetric Hybrid Access System and Method

August 16, 1996

* * * *

DRAWING CHANGE AUTHORIZATION REQUEST

Honorable Commissioner of Patents
& Trademarks
Washington, D.C, 20231

Sir,

It is respectfully requested that Applicant be permitted to amend Figures 3, 7, 8, 10, 12, 15 and 16 as indicated in red on the attached sheets.

Respectfully submitted,
CUSHMAN DARBY & CUSHMAN, L.L.P.

By: _____
Lawrence Harbin
Reg. No. 27,644

1100 New York Avenue, Suite 900
Washington, D.C. 20005-3918
Tel: (202) 861-3000
Fax: (202) 861-3716
217537

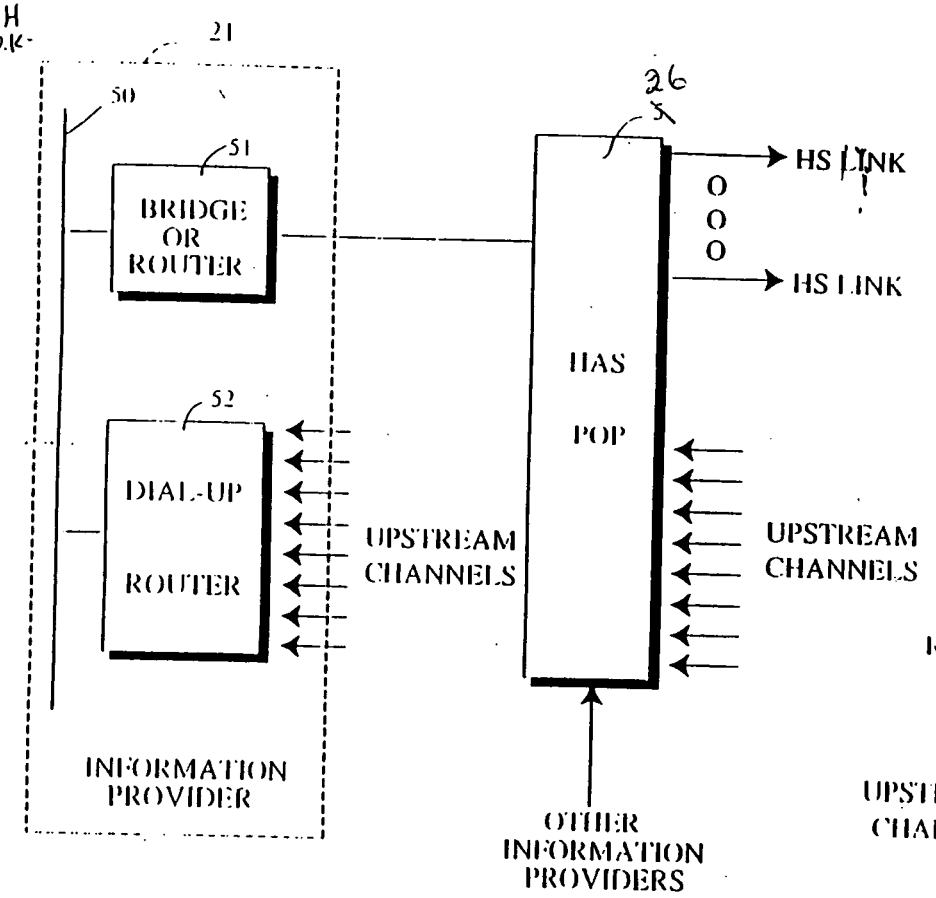

FIGURE 3a

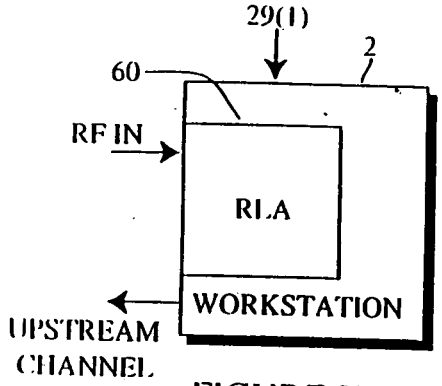

FIGURE 3b

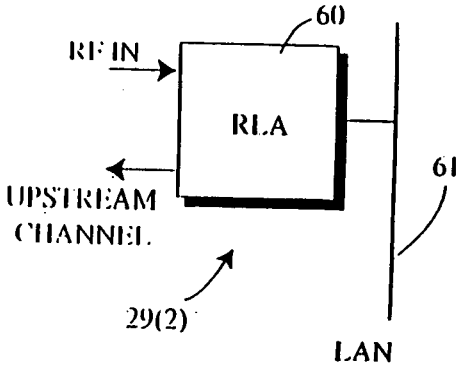

FIGURE 3c

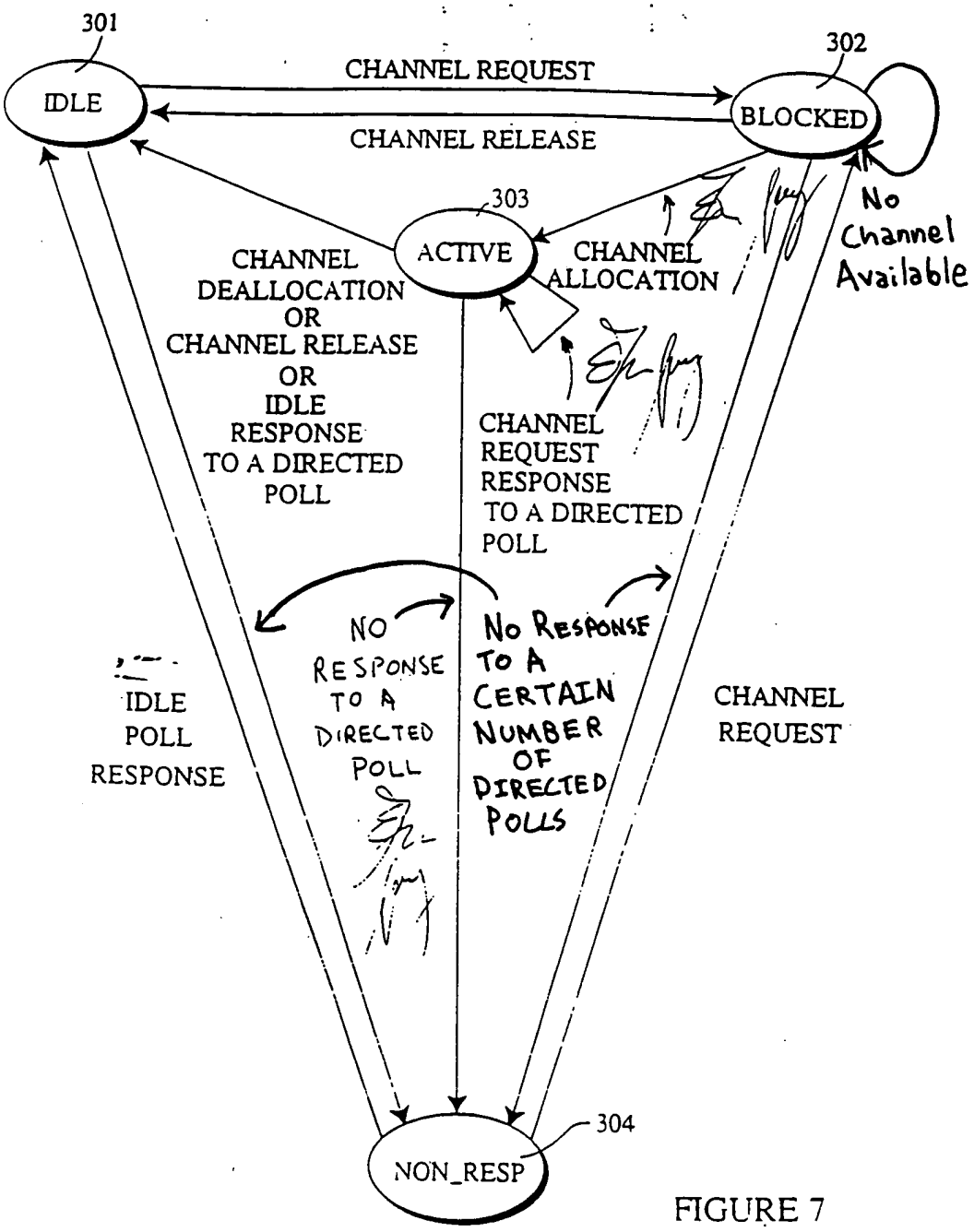

FIGURE 7

SH O.K.

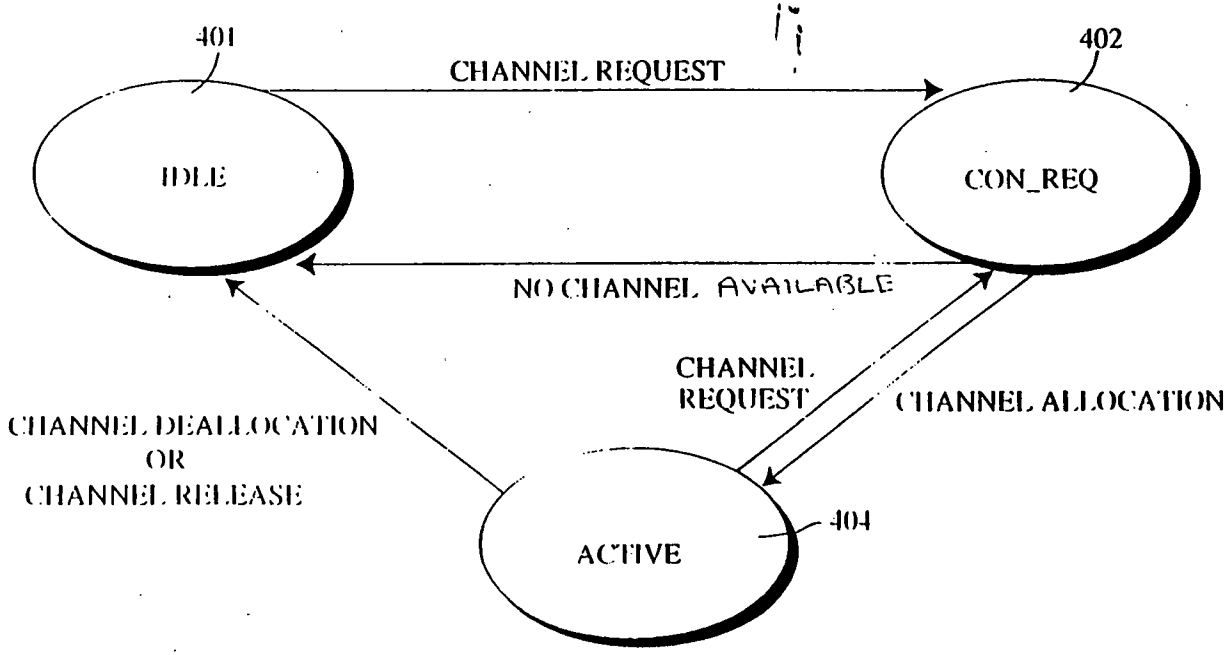
401
CHANNEL REQUEST
402
IDLE
CON_REQ
NO CHANNEL AVAILABLE
CHANNEL
REQUEST
CHANNEL ALLOCATION
CHANNEL DEALLOCATION
OR
CHANNEL RELEASE
404
ACTIVE

FIGURE 8

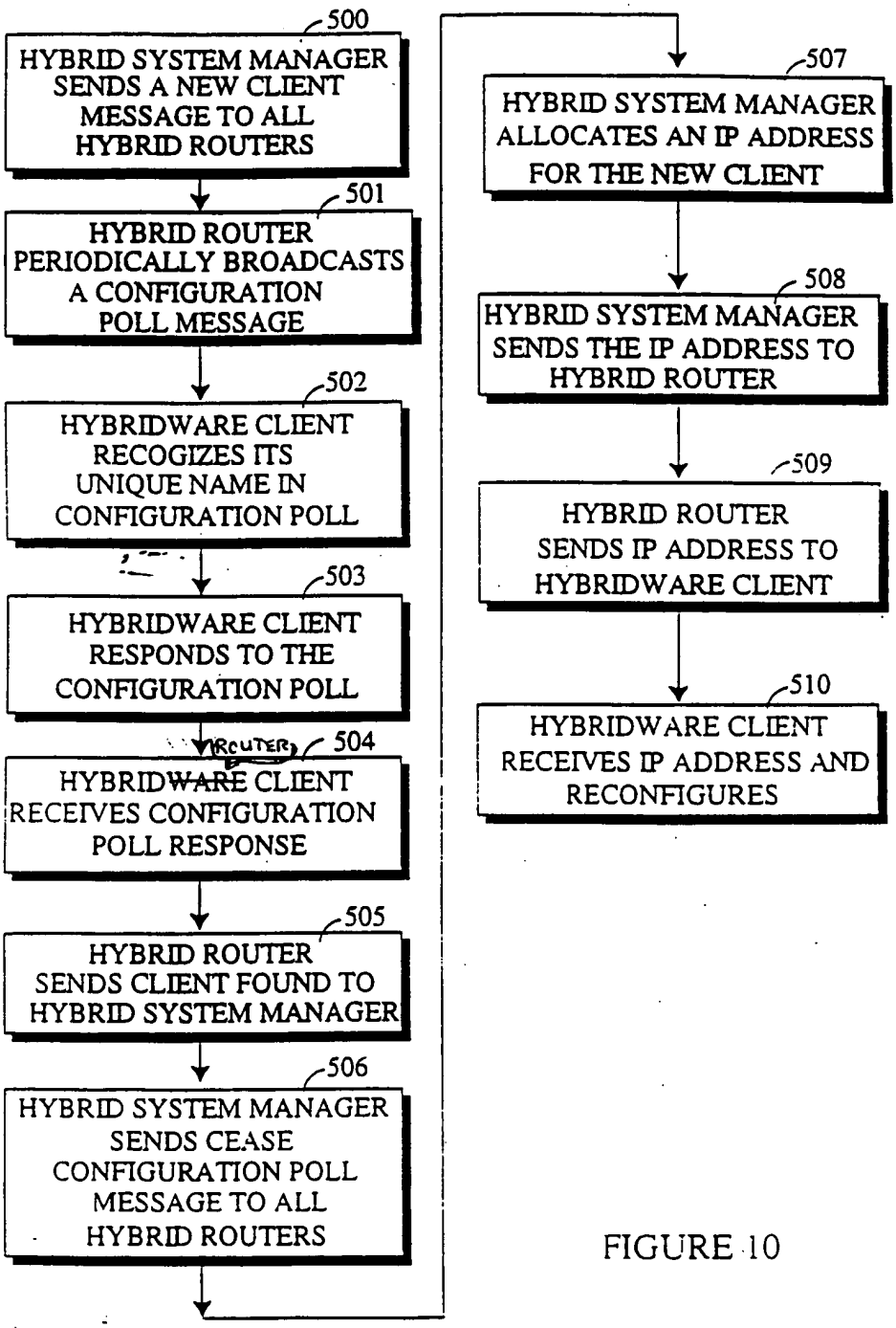
500
HYBRID SYSTEM MANAGER SENDS A NEW CLIENT MESSAGE TO ALL HYBRID ROUTERS
501
HYBRID ROUTER PERIODICALLY BROADCASTS A CONFIGURATION POLL MESSAGE
502
HYBRIDWARE CLIENT RECOGIZES ITS UNIQUE NAME IN CONFIGURATION POLL
503
HYBRIDWARE CLIENT RESPONDS TO THE CONFIGURATION POLL
504
HYBRIDWARE CLIENT RECEIVES CONFIGURATION POLL RESPONSE
505
HYBRID ROUTER SENDS CLIENT FOUND TO HYBRID SYSTEM MANAGER
506
HYBRID SYSTEM MANAGER SENDS CEASE CONFIGURATION POLL MESSAGE TO ALL HYBRID ROUTERS
507
HYBRID SYSTEM MANAGER ALLOCATES AN IP ADDRESS FOR THE NEW CLIENT
508
HYBRID SYSTEM MANAGER SENDS THE IP ADDRESS TO HYBRID ROUTER
509
HYBRID ROUTER SENDS IP ADDRESS TO HYBRIDWARE CLIENT
510
HYBRIDWARE CLIENT RECEIVES IP ADDRESS AND RECONFIGURES

FIGURE 10

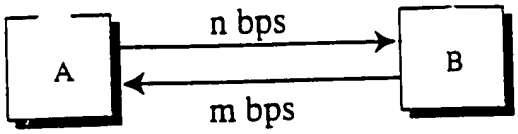

FIGURE 12a
PRIOR ART

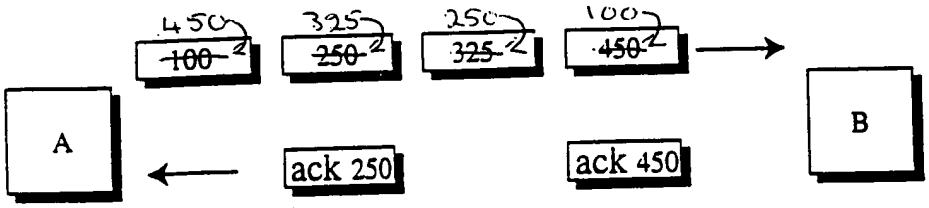

FIGURE 12b
PRIOR ART

SH
O.K.

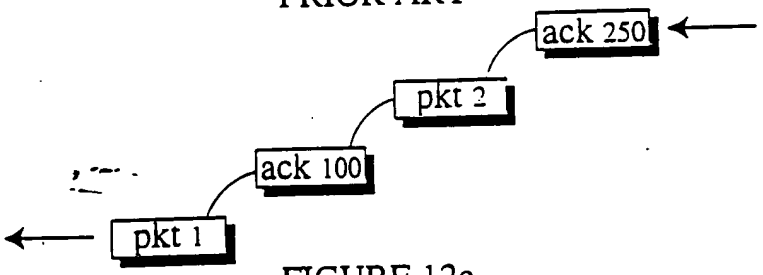

FIGURE 12c

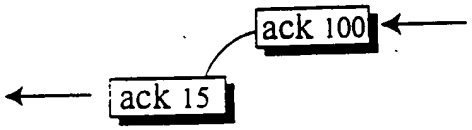

FIGURE 12d

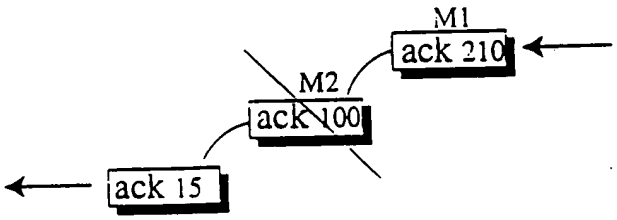

FIGURE 12e

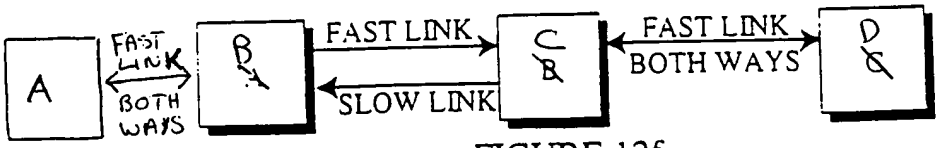

FIGURE 12f

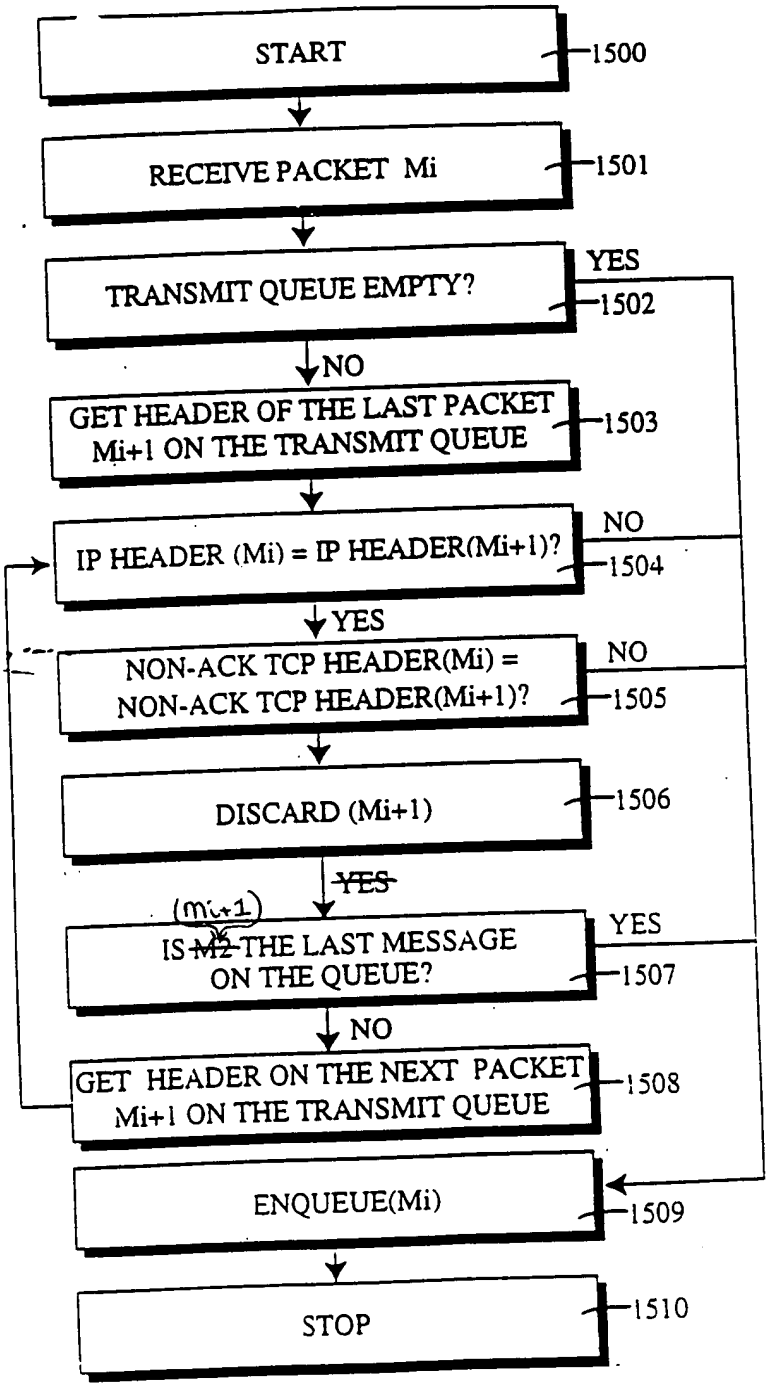
START
1500
RECEIVE PACKET Mi
1501
TRANSMIT QUEUE EMPTY?
YES
1502
NO
GET HEADER OF THE LAST PACKET Mi+1 ON THE TRANSMIT QUEUE
1503
IP HEADER (Mi) = IP HEADER(Mi+1)?
NO
1504
YES
NON-ACK TCP HEADER(Mi) = NON-ACK TCP HEADER(Mi+1)?
NO
1505
DISCARD (Mi+1)
1506
YES
IS THE LAST MESSAGE ON THE QUEUE?
YES
1507
NO
GET HEADER ON THE NEXT PACKET Mi+1 ON THE TRANSMIT QUEUE
1508
ENQUEUE(Mi)
1509
STOP
1510

FIGURE 15

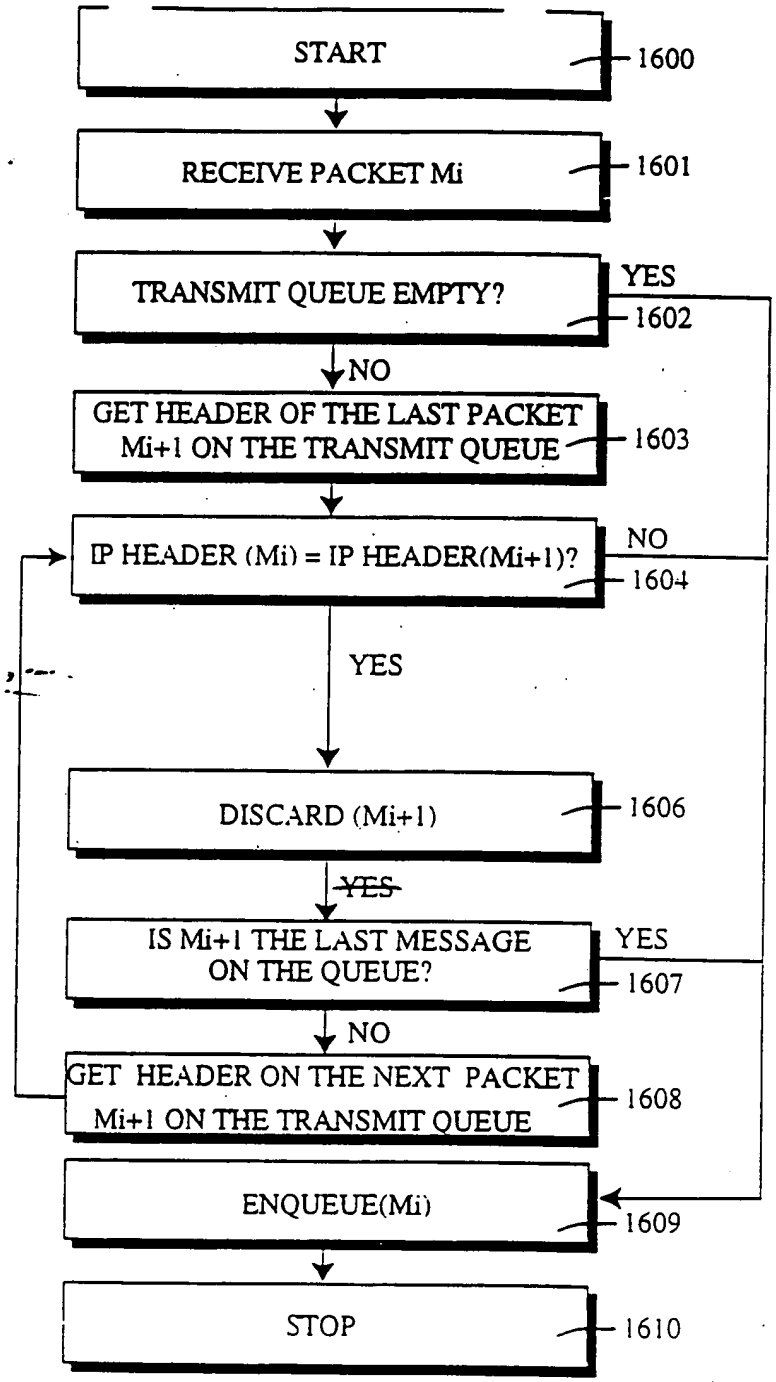

FIGURE 16

SH
O.K.

.CD&C_2028220944 ; 8-20-96 ;11:43AM ; CD&C_2028220944→ 7033059508;# 1

#12
Rejection P/L 266 B.3 and 8/29/96

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Attorneys at Law
Ninth Floor, 1100 New York Avenue, N.W.
Washington, D.C. 20005-3918
Telephone: (202) 861-3000

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	Gp 1800	(703) 305-3014	Gp 3200	(703) 305-3579
	Gp 2100	(703) 305-3431	Gp 3300	(703) 305-3590
	Gp 2200/2900	(703) 305-3603	Gp 3400	(703) 305-3463
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In re PATENT APPLICATION of
Inventor(s) MOURA et al.
Appln. No. 0 8 /426,920
series code ↑ ↑ serial no.
Filed: April 21, 1995

Group Art Unit: 2603
Examiner: S. Horn

Atty. Dkt. 217537 /
M# / Client Ref.

TITLE: ASYMMETRIC HYBRID
ACCESS SYSTEM

Date: August 20, 1996

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7225 / 217537
C# / M#

CDC-286 8/94

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION of

MOURA

Appln. No.: 08/426,920 Group Art Unit: 2603

Filed: April 21, 1995 Examiner: S. Horn

Title: REMOTE LINK ADAPTER FOR USE IN TV BROADCAST DATA TRANSMISSION

* * * * *

August 20, 1996

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Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

Enclosed please find Power of Attorney from Assignee and Revocation of Prior Powers for the above referenced application.

Respectfully submitted,

CUSHMAN DARBY & DARBY, L.L.P.

By _____
Lawrence Harmon
Reg. No. 27,644
Tel: (202) 861-3716
Fax: (202) 822-0944

LH:er

1100 New York Avenue, N.W.
Ninth Floor
Washington, D.C. 20005-3918
(202) 861-3000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION of

Inventor(s): Eduardo J. Moura, et al.

Appln. No.: 08/426,829
series code / serial no.

Filing Date: April 21, 1995

Group Art Unit: 2603

Examiner: Shick Hom

Atty. Dkt: 7225/217637
Mtr / Client Ref.

Title: Asymmetric Hybrid Access System

POWER OF ATTORNEY FROM ASSIGNEE AND REVOCATION OF PRIOR POWERS

Hon. Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

The undersigned being the assignee of record in the above-entitled patent application as shown by the chain of title from the original owner to the assignee as recorded on Reel ____, Frame ____, hereby revokes all previous powers and appoints the Cushman Darby & Cushman Intellectual Property Group of Pillsbury Madison & Sutro, LLP, Ninth Floor, East Tower 1100 New York Avenue, N.W., Washington, D.C. 20005-3918 telephone number (202) 861-3000 (to whom all communications about this application are to be directed), and the below named persons (of the same address), individually and collectively, our attorneys to prosecute this patent application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent:

Paul N. Kokulis	16773	Kendrew H. Colton	30368
Raymond F. Lippitt	17519	Chris Comuntzis	31097
G. Lloyd Knight	17698	Lawrence Harbin	27844
Carl G. Love	18781	Paul E. White, Jr.	32011
Edgar H. Martin	20534	Michelle N. Lester	32331
William K. West, Jr.	22057	Jeffrey A. Simenauer	31933
Kevin E. Joyce	20508	Robert A. Molan	29834
Edward M. Prince	22429	G. Paul Edgell	24238
David W. Brinkman	20817	Lynn E. Eccleston	35861
George M. Sirilla	18221	David A. Jakopin	32995
Donald J. Bird	25323	Mark G. Paulson	30793
W. Warren Taltavull	28647	John P. Moran	30506
Peter W. Gowdey	25872	Timothy J. Klima	34852
Dale S. Lazar	28872	James D. Barquist	34776
Glenn J. Perry	28458	Stephen C. Glazier, P.C.	31361

Assignee has reviewed the evidentiary document(s) for the aforesaid chain of title and hereby certifies that, to the best of assignee's knowledge and belief, title is in the undersigned assignee. Address all further correspondence to Lawrence Harbin, 1100 New York Avenue, N.W., Suite 900 East Tower, Washington, D.C. 20005-3918 whose telephone number is (202) 861-3718.

Hybrid Networks, Inc.
Assignee

By _____
Name: Richard Fuller
Title: Vice President

7/15/96
Date

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AUG 21 1996
GROUP 2600

CERTIFICATE UNDER 37 CFR 3.73(b)

Applicant: Eduardo J. Moura et al.

Application No.: 08/426,920 Filed: April 21, 1995

For: Asymmetric Hybrid Access System and Method

Hybrid Networks, Inc., a Corporation
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

certifies that it is the assignee of the entire right, title and interest in the patent application identified above by virtue of either:

A. [x] An assignment from the inventor(s) of the patent application identified above. The assignment was recorded in the Patent and Trademark Office at Reel 7493, Frame 0486, or for which a copy thereof is attached.

OR

B. [ ] A chain of title from the inventor(s), of the patent application identified above, to the current assignee as shown below:

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The document was recorded in the Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____
The document was recorded in the Patent and Trademark Office at
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The document was recorded in the Patent and Trademark Office at
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[ ] Additional documents in the chain of title are listed on a supplemental sheet.

[x] Copies of assignments or other documents in the chain of title are attached.

The undersigned has reviewed all the documents in the chain of title of the patent application identified above and, to the best of undersigned's knowledge and belief, title is in the assignee identified above.

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements, and the like so made, are punishable by fine or imprisonment, or both, under Section 1001, Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date : August 14, 1996

Name : Richard Fuller

Title : Vice President

Signature: RF

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SEPTEMBER 29, 1995 PTAS

case 1512

ROBERT P. SABATH
FENWICK & WEST
TWO PALO ALTO SQUARE, SUITE 600
PALO ALTO, CA 94306

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PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 703-308-9723. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, ASSIGNMENT DIVISION, BOX ASSIGNMENTS, NORTH TOWER BUILDING, SUITE 10C35, WASHINGTON, D.C. 20231.

RECORDATION DATE: 04/21/1995 REEL/FRAME: 7493/0486
NUMBER OF PAGES: 2

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:
MOURA, EDUARDO J. DOC DATE: 04/21/1995

ASSIGNOR:
GRONSKI, JAN MAKSYMILIAM DOC DATE: 04/21/1995

ASSIGNEE:
HYBRID NETWORKS, INC.
10201 BUBB ROAD
CUPERTINO, CALIFORNIA 95014

SERIAL NUMBER: 08426920 FILING DATE: 04/21/1995
PATENT NUMBER: ISSUE DATE:

JEEVON JONES, EXAMINER
ASSIGNMENT DIVISION
OFFICE OF PUBLIC RECORDS

RECEIVED
OCT 16 1995
FENWICK & WEST

To the Assistant Commissioner of Patents: Documents or copy thereof:

1. Name of conveying party(ies):

Eduardo J. Moura and Jan Maksymiliam Gronski

Additional name(s) of conveying party(ies) attached?

[ ] Yes [X] No

2. Name and address of receiving party(ies):

Name: Hybrid Networks, Inc

Internal Address:

Street Address: 10201 Bubb Road

City: Cupertino State: CA ZIP: 95014

Additional name(s) & address(es) attached?

[ ] Yes [X] No

3. Nature of Conveyance:

[X] Assignment [ ] Merger

[ ] Security Agreement [ ] Change of Name

[ ] Other _____

Execution Date: April 21, 1995

4. Application number(s) or patent number(s):

If this document is being filed together with a new application, the execution date of the application is: April 21, 1995

A. Patent Application No.(s).

B. Patent No.(s)

Additional numbers attached? [ ] Yes [X] No

5. Name and address of party to whom correspondence concerning document should be mailed:

Name: Robert P. Sabath

Internal Address: Fenwick & West

Street Address: Two Palo Alto Square, Suite 600

City: Palo Alto State: CA ZIP: 94306

6. Total number of applications and patents involved: [1]

7. Total fee (37 CFR 3.41): $40.00

[ ] Enclosed

[X] Authorized to be charged to deposit account

8. Deposit account number: 19-2555

(Attach duplicate copy of this page if paying by deposit account)

DO NOT USE THIS SPACE

CS14038 05/02/95 08426920 19-2555 140 581 40.00CH

9. Statement and signature:

To the best of my knowledge and belief, the foregoing information is true and correct and any attached copy is a true copy of the original document.

Robert P. Sabath
Name of person signing

Signature

April 21, 1995
Date

Total number of pages including cover sheet, attachments, document: [2]

Mail documents to be recorded with required cover sheet information to:
Assistant Commissioner of Patents, Box Assignments
Washington, D.C. 20231

Case Docket No. 1572

323-01572/312008.1/04-21-95/04:56 PM

08/426920

ASSIGNMENT

For good and valuable consideration, receipt of which is hereby acknowledged, we, EDUARDO J. MOURA and JAN MAKSYMILIAM GRONSKI, do hereby sell, assign and transfer unto HYBRID NETWORKS, INC., a Delaware corporation whose address is 10201 Bubb Road, Cupertino, CA 95014 (called the Assignee herein), and its successors and assigns, the entire title, interest and right, including the right of priority, in, to and under an application for Letters Patent of the United States entitled "ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD" executed by us this day, and the inventions and any of them therein set forth and described, and any and all Letters Patent of the United States and of countries foreign thereto which may be granted thereon or therefor or corresponding thereto;

And for the above consideration we agree promptly upon request of the Assignee, its heirs, successors or assigns, to communicate any facts known to us respecting said application and the invention set forth therein, and to execute and deliver without further compensation any power of attorney, assignment, application, whether original, continuation, divisional or reissue, or other papers which may be necessary or desirable fully to secure to the Assignee, its heirs, successors and assigns, the inventions and any of them described in said application and all patent rights therein, in the United States and in any country foreign thereto, and to cooperate and assist in the prosecution of interference proceedings involving said inventions and in the adjudication and re-examination of said Letters Patent, provided the expenses which may be incurred by us in lending such cooperation and assistance be paid by the Assignee.

IN WITNESS WHEREOF, we hereunto set our hand and seal this 21 day of April, 1995.

Eduardo J. Moura
EDUARDO J. MOURA

Jan M. Gronski
JAN MAKSYMILIAM GRONSKI

Jan Maksymilian Gronski

State of California
County of Santa Clara

On April 21 1995 before me, Beverly M. Kehoe Shea personally appeared Eduardo J. Moura personally known to me or proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

Witness my hand and official seal.

Beverly M. Kehoe Shea
Notary Public

Notary's Seal

BEVERLY M. KEHOE SHEA
COMM. # 1084836
Notary Public — California
SANTA CLARA COUNTY
My Comm. Expires AUG 4, 1998

18323-01572/311997.1/04-21-95/10:29 AM

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
08/427920	04/21/95	MOURA	1572

EXAMINER	
HOM, SHICK	
ART UNIT	**PAPER NUMBER**
2602	13

ROBERT P SABATH
FENWICK & WEST
TWO PALO ALTO SQUARE SUITE 500
PALO ALTO CA 94306

DATE MAILED: 08/29/96

06/21/96

This is in response to the Power of Attorney filed _____.

☐ 1. The Power of Attorney to you in this application **has been revoked** by the applicant. Future correspondence will be mailed to the new address of record. 37 CFR 1.33.

☑ 2. The Power of Attorney to you in this application **has been revoked** by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record. (37 CFR 1.33).

☐ 3. The withdrawal as attorney in this application **has been accepted.** Future correspondence will be mailed to the new address of record. 37 CFR 1.33.

Susan Bond (Susan260)
This is a communication from the
Patent and Trademark Office
703/305-4749

☑ 4. The Power of Attorney in this application **is accepted.** Correspondence in this application will be mailed to the below-noted address as provided by 37 CFR 1.33.

☐ 5. The Power of Attorney in this application **is not accepted** for the reason(s) checked below:

- ☐ a. The Power of Attorney is from an assignee and the Certificate required by 37 CFR 3.73 (b) has not been received.
- ☐ b. The person signing for the assignee has omitted their empowerment to sign on behalf of the assignee.
- ☐ c. The inventor(s) is without authority to appoint attorneys since the assignee has intervened as provided by 37 CFR 3.71.
- ☐ d. The signature of _____, a co-inventor in this application, has been omitted. The Power of Attorney will be entered upon receipt of confirmation signed by said co-inventor.
- ☐ e. The person(s) appointed in the Power of Attorney is not registered to practice before the U.S. Patent & Trademark Office.
- ☐ f. The revocation is not signed by the applicant, the assignee of the entire interest, or **one** particular principal attorney having the authority to revoke.

H0000189

LAWRENCE HARBIN
100 NEW YORK AVENUE, N.W.
SUITE 900 EAST TOWER
WASHINGTON, D.C. 20005-3918

Susan Bond (Susan260)
This is a communication from the
Patent and Trademark Office
703/305-4749

OL-305 (REV. 10-94) RETAIN THIS COPY IN THE APPLICATION FILE COPY A

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKETT NO.
08/426,920	04/21/95	MOURA	E 1572

HOM, S — EXAMINER

26M1/0905

LAWRENCE HARBIN
1100 NEW YORK AVENUE, N.W.
SUITE 900 EAST TOWER
WASHINGTON, D.C. 20005-3918

ART UNIT	PAPER NUMBER
2603	14

DATE MAILED: 09/05/96

EXAMINER INTERVIEW SUMMARY RECORD

All participants (applicant, applicant's representative, PTO personnel):

(1) Attorney Lawrence Harbin (3) _____

(2) Examiner Shick Hom (4) _____

Date of Interview 8-28-96, 8-30-96, 9-3-96

Type: ☒ Telephonic ☐ Personal (copy is given to ☐ applicant ☐ applicant's representative).

Exhibit shown or demonstration conducted: ☐ Yes ☒ No. If yes, brief description: _____

Agreement ☒ was reached with respect to some or all of the claims in question. ☐ was not reached.

Claims discussed: 1-74

Identification of prior art discussed: N/A

Description of the general nature of what was agreed to if an agreement was reached, or any other comments: On 8-28-96, Attorney agreed to correct type & 112 problems in claims by Examiner's amend. On 8-30-96, Attorney agreed to delete "said ... Hybridware™ server" in claim 1. On 9-3-96, Attorney agreed to further 112 changes to claims 1, 15, 24, 35, 56, 58, 67 and 69.

(A fuller description, if necessary, and a copy of the amendments, if available, which the examiner agreed would render the claims allowable must be attached. Also, where no copy of the amendments which would render the claims allowable is available, a summary thereof must be attached.)

☒ 1. It is not necessary for applicant to provide a separate record of the substance of the interview.

Unless the paragraph below has been checked to indicate to the contrary, A FORMAL WRITTEN RESPONSE TO THE LAST OFFICE ACTION IS NOT WAIVED AND MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW (e.g., items 1-7 on the reverse side of this form). If a response to the last Office action has already been filed, then applicant is given one month from this interview date to provide a statement of the substance of the interview.

☐ 2. Since the examiner's interview summary above (including any attachments) reflects a complete response to each of the objections, rejections and requirements that may be present in the last Office action, and since the claims are now allowable, this completed form is considered to fulfill the response requirements of the last Office action. Applicant is not relieved from providing a separate record of the substance of the interview unless box 1 above is also checked.

Shick Hom
Examiner's Signature

PTOL-413 (REV. 2-93)

ORIGINAL FOR INSERTION IN RIGHT HAND FLAP OF FILE WRAPPER

H0000190

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO
08/426,920	04/21/95	MOURA	1972

EXAMINER

26M1/0905

LAWRENCE HARBIN
1100 NEW YORK AVENUE, N.W.
SUITE 900 EAST TOWER
WASHINGTON, D.C. 20005-3918

ART UNIT	PAPER NUMBER
2607	15

09/03/96

DATE MAILED.

NOTICE OF ALLOWABILITY

PART I.

1. [X] This communication is responsive to Amend of 8-5-96 & 8-16-96 & Letter of 8-16-96.
2. [X] All the claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice Of Allowance And Issue Fee Due or other appropriate communication will be sent in due course.
3. [X] The allowed claims are 1-6, 15, 17, 19, 20, 24 - 74.
4. [ ] The drawings filed on _____ are acceptable.
5. [ ] Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has [ ] been received. [ ] not been received. [ ] been filed in parent application Serial No. _____, filed on _____.
6. [X] Note the attached Examiner's Amendment.
7. [X] Note the attached Examiner Interview Summary Record, PTOL-413.
8. [ ] Note the attached Examiner's Statement of Reasons for Allowance.
9. [ ] Note the attached NOTICE OF REFERENCES CITED, PTO-892.
10. [X] Note the attached INFORMATION DISCLOSURE CITATION, PTO-1449.

PART II.

A SHORTENED STATUTORY PERIOD FOR RESPONSE to comply with the requirements noted below is set to EXPIRE THREE MONTHS FROM THE "DATE MAILED" indicated on this form. Failure to timely comply will result in the ABANDONMENT of this application. Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

1. [ ] Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL APPLICATION, PTO-152, which discloses that the oath or declaration is deficient. A SUBSTITUTE OATH OR DECLARATION IS REQUIRED.
2. [X] APPLICANT MUST MAKE THE DRAWING CHANGES INDICATED BELOW IN THE MANNER SET FORTH ON THE REVERSE SIDE OF THIS PAPER.
   a. [X] Drawing informalities are indicated on the NOTICE RE PATENT DRAWINGS, PTO-948, attached hereto or to Paper No. 5. CORRECTION IS REQUIRED.
   b. [X] The proposed drawing correction filed on 8-16-96 has been approved by the examiner. CORRECTION IS REQUIRED.
   c. [ ] Approved drawing corrections are described by the examiner in the attached EXAMINER'S AMENDMENT. CORRECTION IS REQUIRED.
   d. [X] Formal drawings are now REQUIRED.

Any response to this letter should include in the upper right hand corner, the following information from the NOTICE OF ALLOWANCE AND ISSUE FEE DUE: ISSUE BATCH NUMBER, DATE OF THE NOTICE OF ALLOWANCE, AND SERIAL NUMBER.

Attachments:

- [X] Examiner's Amendment
- [X] Examiner Interview Summary Record, PTOL-413
- [ ] Reasons for Allowance
- [ ] Notice of References Cited, PTO-892
- [X] Information Disclosure Citation, PTO-1449
- [ ] Notice of Informal Application, PTO-152
- [ ] Notice re Patent Drawings, PTO-948
- [ ] Listing of Bonded Draftsmen
- [ ] Other

PTOL-37 (REV. 4-89) *

H0000191

1. An Examiner's Amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 C.F.R. § 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the Issue Fee.

Authorization for this Examiner's Amendment was given in a telephone interview with Attorney Lawrence Harbin on 8-28-96.

2. The application has been amended as follows:

In claim 1, lines 25-26, delete "at least a single data processor" and insert ---said single data processor---. In claim 1, lines 18-19 delete "said upstream router including a Hybridware server,".

In claim 5, line 3, delete "at least one of a" and "an" and insert ---said--- and ---said---, respectively.

In claim 15, lines 7-8, delete "said asymmetric network" and insert ---said wide area network---. In claim 15, line 12, delete "a downstream channel" and insert ---said downstream channel---.

In claim 17, lines 17-18 delete "a transmit queue" and insert ---a first transmit queue---, and in line 19 delete "a transmit queue" and insert ---a second transmit queue---. In claim 17, line 23, before "transmit queue" insert ---second---.

Serial Number: 08/426,920

Art Unit: 2603

In claims 17, 19, 20, and 24, lines 8-9 delete "said downstream channel" and insert ---the downstream channel---.

In claim 20, line 11, delete "sessions" and insert ---session---.

In claims 27-51, 57-58, 61-62, 66-67, and 72-73, line 1 delete "A" and insert ---The---.

In claim 20, line 26 delete "said first and second headers" and insert ---the first and second headers---.

In claim 52, line 28 delete typo "medim" and insert ---medium---. In claim 52, line 34 delete "a shared communication medium" and insert ---said shared medium---.

In claim 59, line 29 and claim 65, line 31 delete "media" and insert ---medium---.

In claim 65, lines 35-37 delete "a host server," "a plurality of remote clients," "a CATV network," and "a shared communication medium" and insert ---said host server---, ---said plurality of remote clients---, ---said CATV broadcast transmission facility---, and ---said shared medium---, respectively.

In claims 68 and 69, lines 9-11 delete "said host server" and insert ---the host server---.

Serial Number: 08/426,920

Art Unit: 2603

In claim 70, line 32 delete "a host server" and insert --- said host server---. In claim 70, line 10 delete "high" and insert ---high speed---.

In claim 71, line 24 delete typo "ata" and insert ---data---. In claim 71, line 14 delete "including".

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shick Hom whose telephone number is (703) 305-4742.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-4750.

Douglas W. Olms

DOUGLAS W. OLMS
SUPERVISORY PATENT EXAMINER
ART UNIT 263

SH
August 30, 1996

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: Box ISSUE FEE
ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

NOTICE OF ALLOWANCE AND ISSUE FEE DUE

LAWRENCE HARBIN
1100 NEW YORK AVENUE, N.W.
SUITE 900 EAST TOWER
WASHINGTON, D.C. 20005-3918

APPLICATION NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT	DATE MAILED
08/426,920	04/21/95	061	[illegible] S 2603	09/05/96

First Named Applicant MOURA, EDUARDO L.

TITLE OF INVENTION: SYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2 1572	370-095.200	299	UTILITY	YES	$425.00	12/05/96

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED.

THE ISSUE FEE MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED.

HOW TO RESPOND TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.
If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is changed, pay twice the amount of the FEE DUE shown above and notify the Patent and Trademark Office of the change in status, or
B. If the status is the same, pay the FEE DUE shown above.

If the SMALL ENTITY is shown as NO:

A. Pay FEE DUE shown above, or

B. File verified statement of Small Entity Status before, or with, payment of 1/2 the FEE DUE shown above.

II. Part B of this notice should be completed and returned to the Patent and Trademark Office (PTO) with your ISSUE FEE. Even if the ISSUE FEE has already been paid by charge to deposit account, Part B should be completed and returned. If you are charging the ISSUE FEE to your deposit account, section "6b" of Part B should be completed.

III. All communications regarding this application must give application number and batch number. Please direct all communication prior to issuance to Box ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

3. PATENT AND TRADEMARK OFFICE COPY

PTOL-85 (REV. 5-96) (0651-0033)

*U.S. GPO: 1996-411-[illegible]/[illegible]

H0000195

PART B—ISSUE FEE TRANSMITTAL

MAILING INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE. Blocks 2 through 6 should be completed where appropriate. All further correspondence including the Issue Fee Receipt, the Patent, advance orders and notification of maintenance fees will be mailed to addressee entered in Block 1 unless you direct otherwise, by: (a) specifying a new correspondence address in Block 3 below; or (b) providing the PTO with a separate "FEE ADDRESS" for maintenance fee notifications with the payment of Issue Fee or thereafter. See reverse for Certificate of Mailing, below.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Time Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending on the needs of the individual case. Any comments on the amount of time required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, D.C. 20231.

DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Issue Fee, Assistant Commissioner for Patents, Washington D.C. 20231

1. CORRESPONDENCE ADDRESS ~~26M1/0905~~
LAWRENCE HARBIN
1100 NEW YORK AVENUE, N.W.
SUITE 900 EAST TOWER
WASHINGTON, D.C. 20005-3918

2. INVENTOR(S) ADDRESS CHANGE (Complete only if there is a change)
INVENTOR'S NAME
Street Address
City, State and ZIP Code
CO-INVENTOR'S NAME
Street Address
City, State and ZIP Code
☐ Check if additional changes are attached

RECEIVED
Publishing Division
SEP 10 1996
GP

APPLICATION NO.	FILING DATE	TOTAL CLAIMS	EXAMINER AND GROUP ART UNIT	DATE MAILED
08/426,920	04/21/95	061	HOM, S 2603	09/05/96

First Named Applicant: MOURA, EDUARDO J.

TITLE OF INVENTION: ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

ATTY'S DOCKET NO.	CLASS-SUBCLASS	BATCH NO.	APPLN. TYPE	SMALL ENTITY	FEE DUE	DATE DUE
2 1572	370-095.200	Z99	UTILITY	YES	$625.00	12/05/96

3. Correspondence address change (Complete only if there is a change)
Cushman Darby & Cushman IP Group
Pillsbury Madison & Sutro LLP
Ninth Floor, East Tower
1100 New York Avenue, NW
Washington, DC 20005-3918

4. For printing on the patent front page, list the names of not more than 3 registered patent attorneys or agents OR, alternatively, the name of a firm having as a member a registered attorney or agent. If no name is listed, no name will be printed.
1 Cushman Darby & Cushman
2 IP Group of Pillsbury
3 Madison & Sutro LLP

5. ASSIGNMENT DATA TO BE PRINTED ON THE PATENT (print or type)
(1) NAME OF ASSIGNEE: Hybrid Networks, Inc.
(2) ADDRESS: (CITY & STATE OR COUNTRY) Cupertino, CA

☐ This application is NOT assigned.
☒ Assignment previously submitted to the Patent and Trademark Office.
☐ Assignment is being submitted under separate cover. Assignments should be directed to Box ASSIGNMENTS.
PLEASE NOTE: Unless an assignee is identified in Block 5, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the PTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

6a. The following fees are enclosed:
☒ Issue Fee $625 ☐ Advance Order - # of Copies
6b. The following fees should be charged to:
DEPOSIT ACCOUNT NUMBER 03-3975,Order 7225/217537
(ENCLOSE A COPY OF THIS FORM)
☐ Issue Fee ☒ Advance Order - # of Copies 25
☒ Any Deficiencies in Enclosed Fees

The COMMISSIONER OF PATENTS AND TRADEMARKS is requested to apply the Issue Fee to the application identified above.

(Authorized Signature) [redacted] (Date) 8/10/96

NOTE: The Issue Fee will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the Patent and Trademark Office.

Certificate of Mailing

Note: If this certificate of mailing is used, it can only be used to transmit the Issue Fee. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Box ISSUE FEE, Assistant Commissioner for Patents, Washington, D.C. 20231

_____ (Date)
_____ (Name of person making deposit)
_____ (Signature)
_____ (Date)

C 810 1 08426920 000325 9607k
242 625.00

1. TRANSMIT THIS FORM WITH FEE

RECEIPT FROM PTO FOR INDICATED ITEMS

(Do NOT Use for New or Continuing Applications of Any Kind)
Use 2 postcards for all New Applns. (Cont/Div/CIP, too)

Appln. No: 08/426,920	Attny: LH
First Inventor: MOURA et al.	Date: September 10, 1996
	Matter No: 217537
	Client No: 7225

ENCLOSED:

- ☐ Response/Amendment ☐ Cover Sheet ☐ Cited/Listed Documents
- ☐ Completion Request for R 53(d)/60(d)/62(d)/PCT Nat.
- # ☐ No. of Pages Abstract
- # ☐ No. of Pages Spec and Claims
- # ☐ No. of Numbered Claims Only
- # ☐ No. of Sheets of Drawings (Figs ☐)
  - ☐ 1 Set Formal ☐ 1 Set Informal ☐ Cover Letter
- ☐ Declaration ☐ # of pages
- ☐ Assignment ☐ Cover Sheet
- ☐ Small Entity Declaration
- ☐ Extension Petition (CDC-111)
- # ☐ No. of Priority Documents
- ☐ IDS including PTO-1449
  - ☐ Cited Documents ☐ Search Report
- [X] Issue Fee Transmittal Form PTOL-85(b) + (c)

$ $625.00 Fee (Check)

OTHER:

Current DUE DATE: December 5, 1996

(Submit Single Copy Only)

OIPE SEP 10 1996 PATENT & TRADEMARK OFFICE

CDC-103A 9/96 d

CUSHMAN DARBY & CUSHMAN, L.L.P.

ATTORNEYS AT LAW
NINTH FLOOR, 1100 NEW YORK AVENUE, N.W.
WASHINGTON, D.C. 20005-3918
TELEPHONE (202) 861-3000

Telefacsimile G3/2
Reply
(202) 822-0944
(202) 822-0678
(202) 822-0679

Telex No. &
6714627 CUSH

FACSIMILE TRANSMISSION Date: October 9, 1996

TO:FIRM: PTO

ATTN: George Pointdexter Your Ref: _____

LOCATION: _____ TELEPHONE #: 305-8189

TELECOPIER #: 305-8755

FROM: NAME: LAWRENCE HARBIN Our Ref: LH/7225/7225

Enter C# 7225 /M#217532 No. Pages (Including Cover Sheet) 2

RETURN TO: LH

IF YOU DO NOT RECEIVE CLEARLY ALL PAGES, PLEASE CONTACT US IMMEDIATELY AT: 202-861-3667 OR 202-861-3583 OR ABOVE FAX/TELEX NOS.

MESSAGE

George:

The back side of Part B is blank. Nothing there.

L. Harbin

CUSHMAN DARBY & CUSHMAN, L.L.P.

ATTORNEYS AT LAW
NINTH FLOOR, 1100 NEW YORK AVENUE, N.W.
WASHINGTON, D.C. 20005-3918
TELEPHONE (202) 861-3000

Telefacsimile G3/2
Reply
(202) 822-0944
(202) 822-0678
(202) 822-0679

Telex No. &
6714627 CUSH

FACSIMILE TRANSMISSION Date: October 9, 1996

TO:FIRM: PTO

ATTN: George Pointdexter Your Ref:

LOCATION: TELEPHONE #: 305-8189

TELECOPIER #: 305-8755

FROM: NAME: LAWRENCE HARBIN Our Ref: LH/7225/7225

Enter C# 7225 /M#217532 No. Pages (Including Cover Sheet) 2

RETURN TO: LH

IF YOU DO NOT RECEIVE CLEARLY ALL PAGES, PLEASE CONTACT US IMMEDIATELY AT: 202-861-3667 OR 202-861-3583 OR ABOVE FAX/TELEX NOS.

MESSAGE

George:

The back side of Part B is blank. Nothing there.

C. Harbin

CDC-006 6/94

(1) 2601 0150 B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Attention: OFFICE OF PUBLICATIONS

In re PATENT APPLICATION of
Inventor(s): MOURA et al.
Appln. No.: 08 | 426,920
Series Code † | Serial No. †

Filed: April 21, 1995
Title: ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

Allowed: September 5, 1996
Batch No.: Z99
Atty. Dkt. 217537 / M# | Client Ref

(Our Deposit Account No. 03-3975)
(Our Order No. 7225 / C# | 217537 / M#

Date: September 10, 1996

FILING OF FORMAL DRAWINGS(S) AFTER ALLOWANCE

Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

1. Please accept the herewith 20 sheet(s) (including any mentioned in line 7)
2. of formal drawing(s) on [X] A4 [ ] 11" [ ] 13" [ ] 14" size paper of
3. Figures(s) 1-20
4. [X] which is/are in lieu of the informal drawing(s) filed earlier.
5. [X] which include the corrections required/approved by the Draftsperson/Examiner
6. in PTO Paper No. 5 dated April 3, 1996

		Large/Small Entity		Fee Code
7. [ ] Photographic Fig(s) _____ is/are filed herewith which attached is the Rule 17(h) requisite fee		$130	$	122
8. Original due date: December 5, 1996	NONE			
9. Petition is hereby made to extend the original due date to cover the date this response is filed for which the requisite fee is attached	(1 mo) (2mos) (3mos)	$110/$55 = $380/$190= $900/$450=	+	115/215 116/216 117/217
	TOTAL FEE ENCLOSED =		$ -0-	

10.

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficiencies only) now or hereafter relative to this application and the resulting Official Document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown in the heading hereof, for which purpose a duplicate copy of this sheet is attached.
This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal sheet is filed.

CUSHMAN DARBY & CUSHMAN
Intellectual Property Group of
Pillsbury Madison & Sutro LLP

1100 New York Avenue, N.W.
Ninth Floor, East Tower
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Tel: (202) 861-3000
Atty/Sec: LH:er

By: Atty: Lawrence Harbin Reg. No. 27,644
Sig:
Fax: (202) 822-0944
Tel: (202) 861-3716

NOTE: File this cover sheet in duplicate with PTO return receipt (CDC-103A) and attachments

H0000200

CDC-125 9/96

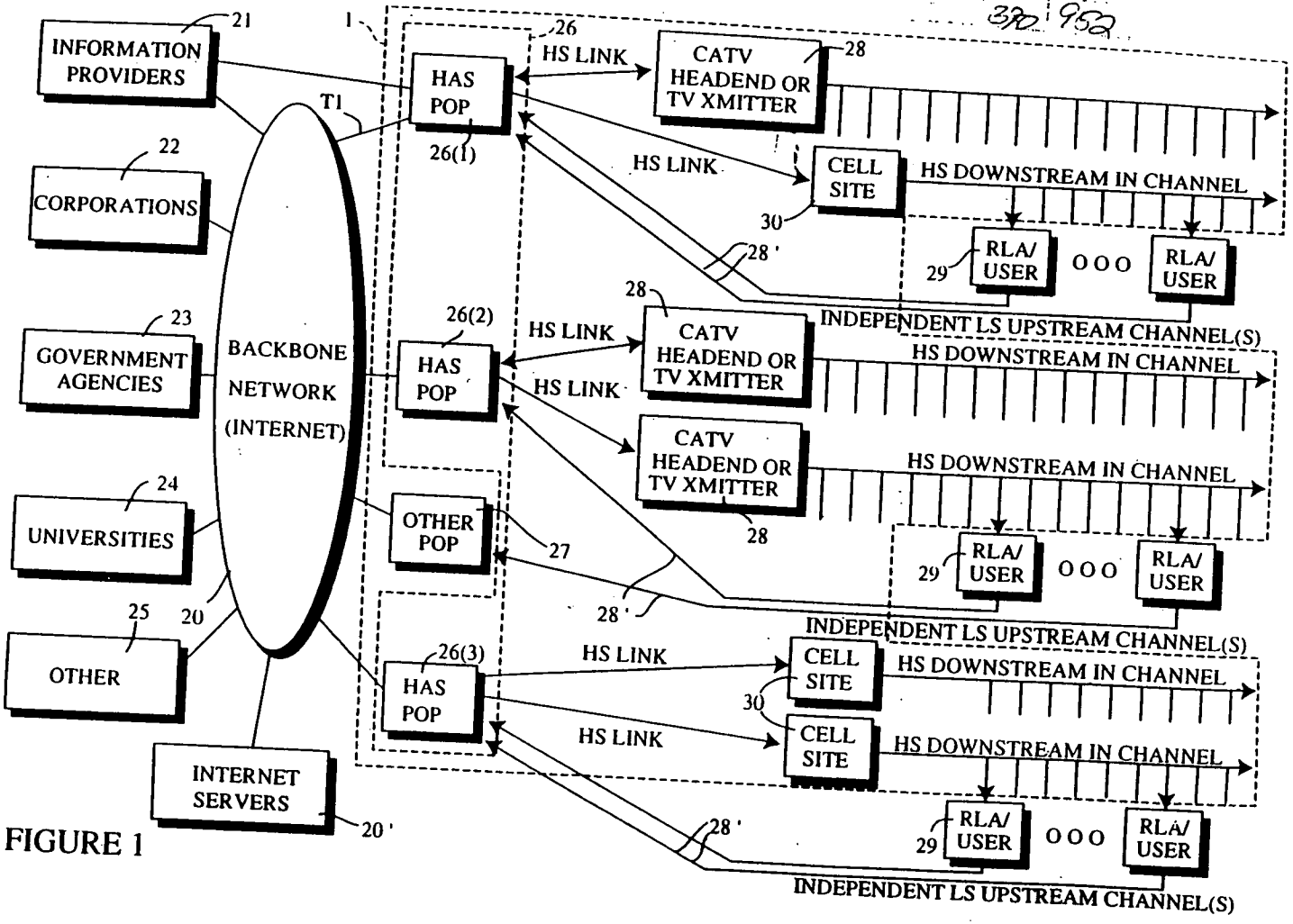

FIGURE 1

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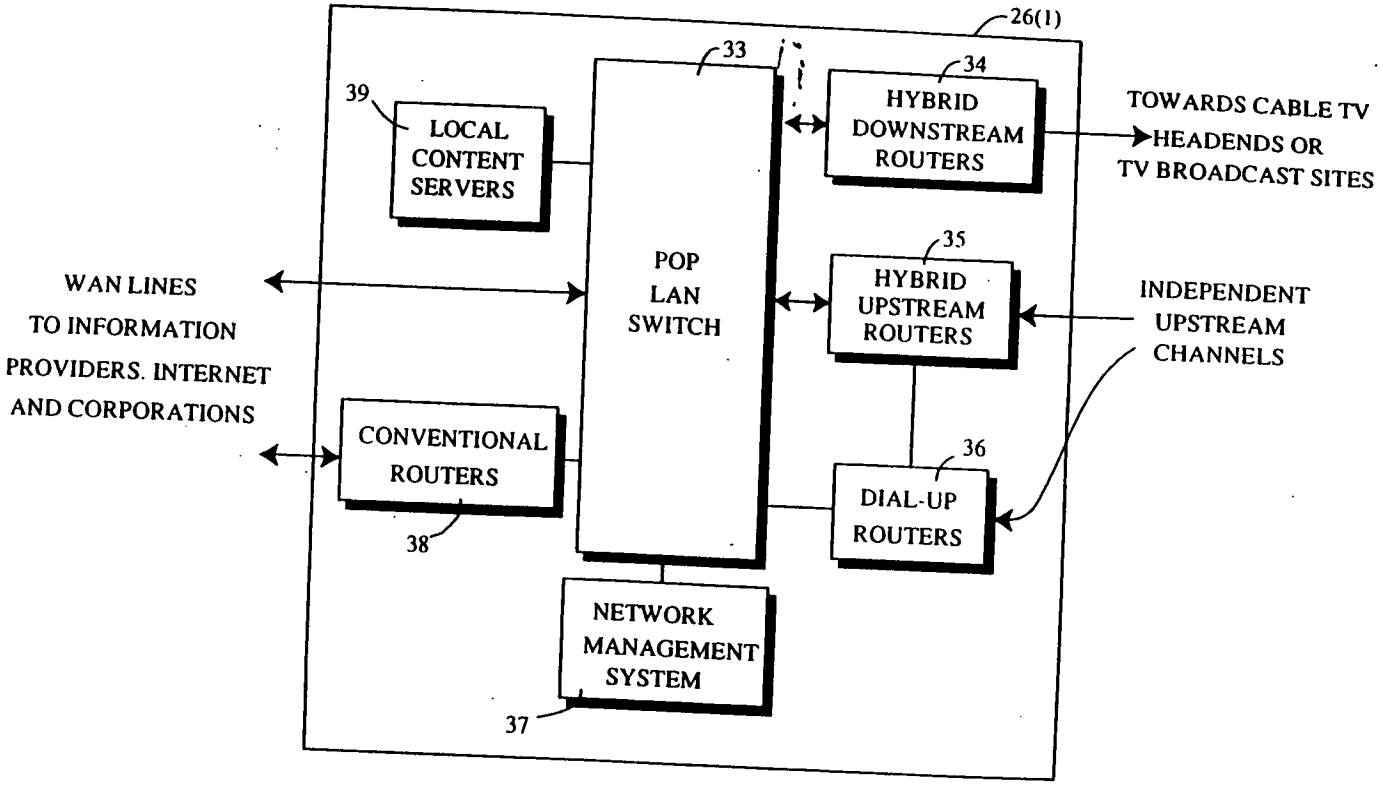
26(1)
33
34
39
LOCAL CONTENT SERVERS
HYBRID DOWNSTREAM ROUTERS
TOWARDS CABLE TV HEADENDS OR TV BROADCAST SITES
POP LAN SWITCH
35
HYBRID UPSTREAM ROUTERS
WAN LINES TO INFORMATION PROVIDERS. INTERNET AND CORPORATIONS
INDEPENDENT UPSTREAM CHANNELS
CONVENTIONAL ROUTERS
36
DIAL-UP ROUTERS
38
NETWORK MANAGEMENT SYSTEM
37

FIGURE 2a

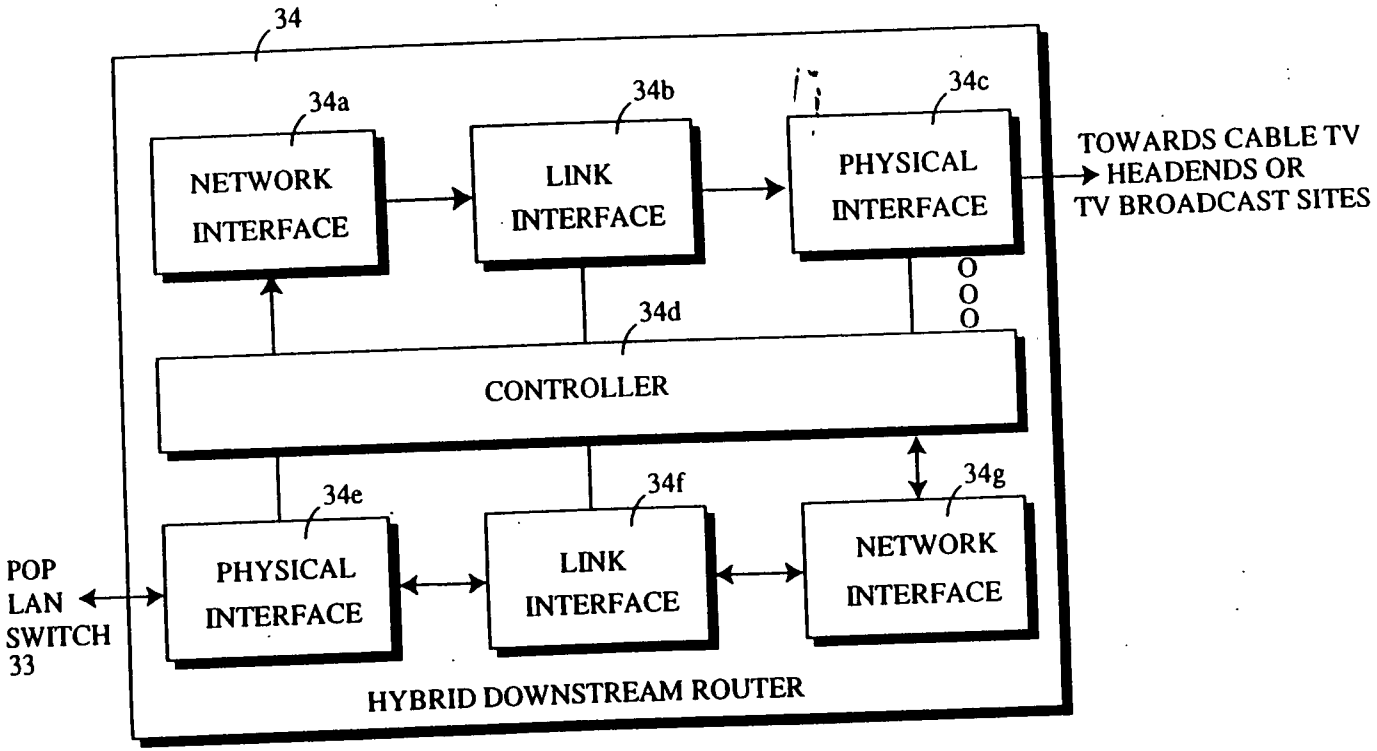
34
34a
NETWORK INTERFACE
34b
LINK INTERFACE
34c
PHYSICAL INTERFACE
TOWARDS CABLE TV HEADENDS OR TV BROADCAST SITES
O O O
34d
CONTROLLER
34e
PHYSICAL INTERFACE
34f
LINK INTERFACE
34g
NETWORK INTERFACE
POP LAN SWITCH 33
HYBRID DOWNSTREAM ROUTER

FIGURE 2b

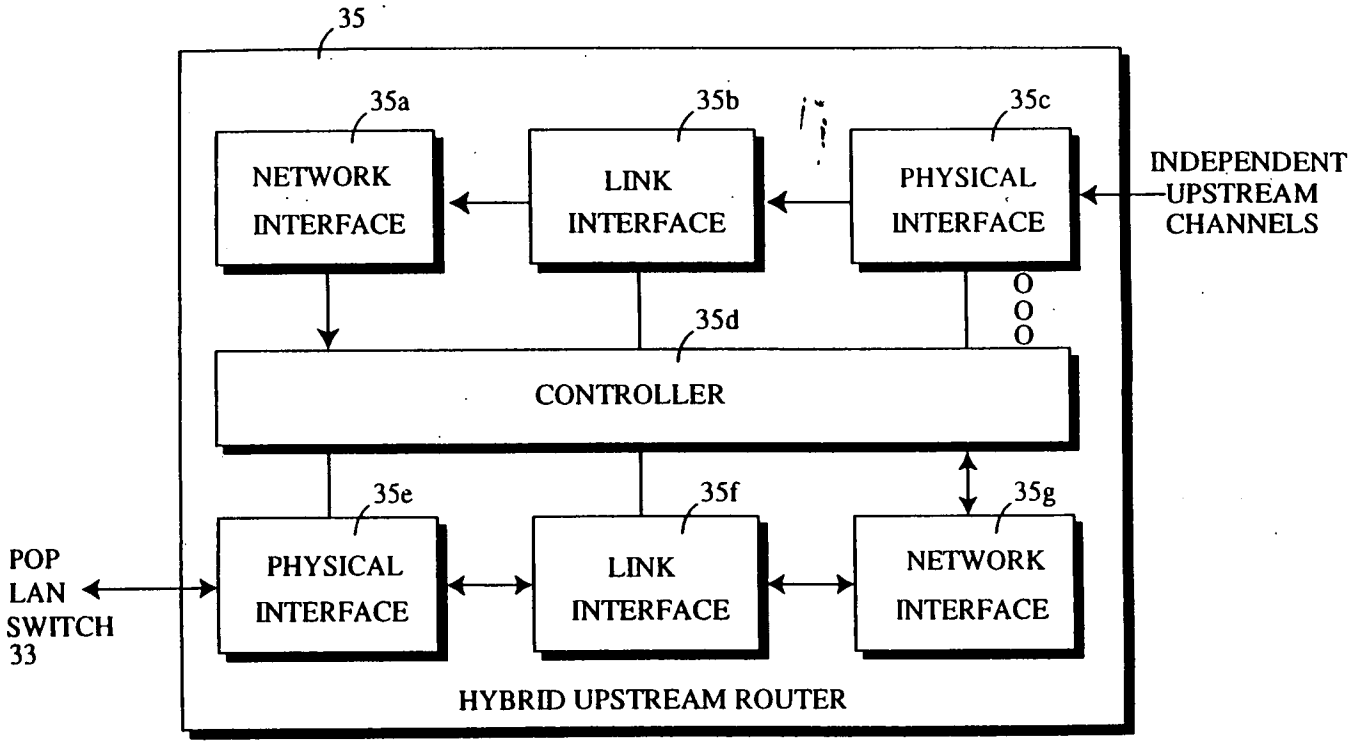
35
35a
35b
35c
NETWORK INTERFACE
LINK INTERFACE
PHYSICAL INTERFACE
INDEPENDENT UPSTREAM CHANNELS
35d
CONTROLLER
35e
35f
35g
POP LAN SWITCH 33
PHYSICAL INTERFACE
LINK INTERFACE
NETWORK INTERFACE
HYBRID UPSTREAM ROUTER

FIGURE 2c

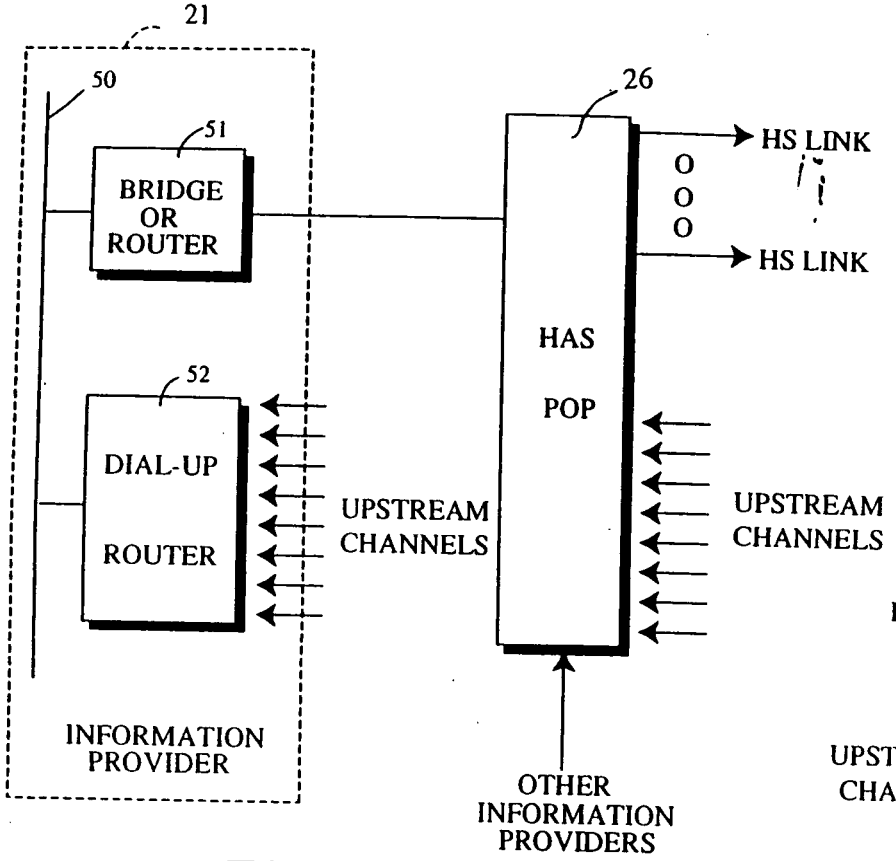

FIGURE 3a

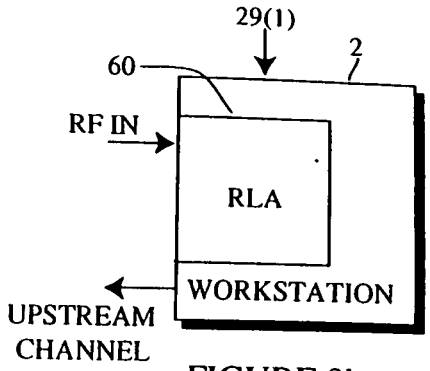

FIGURE 3b

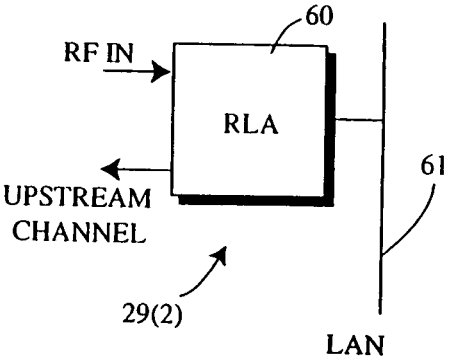

FIGURE 3c

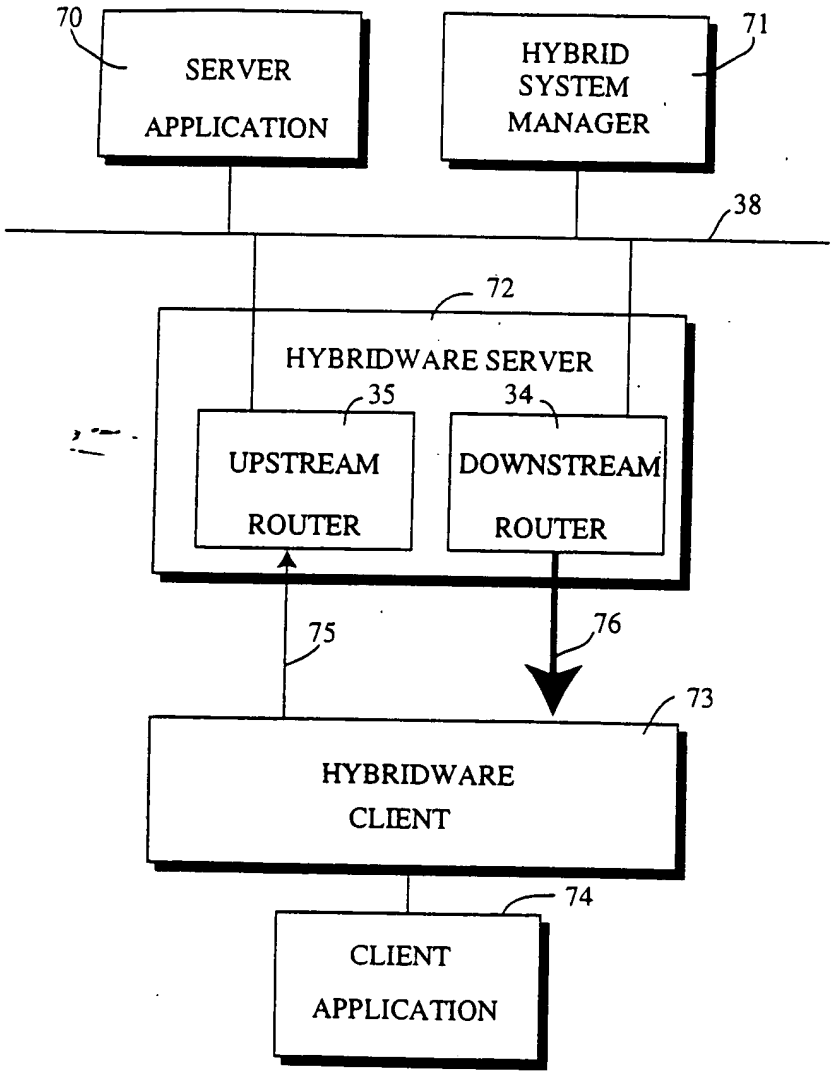
70
SERVER APPLICATION
71
HYBRID SYSTEM MANAGER
38
72
HYBRIDWARE SERVER
35
34
UPSTREAM ROUTER
DOWNSTREAM ROUTER
75
76
73
HYBRIDWARE CLIENT
74
CLIENT APPLICATION

FIGURE 4

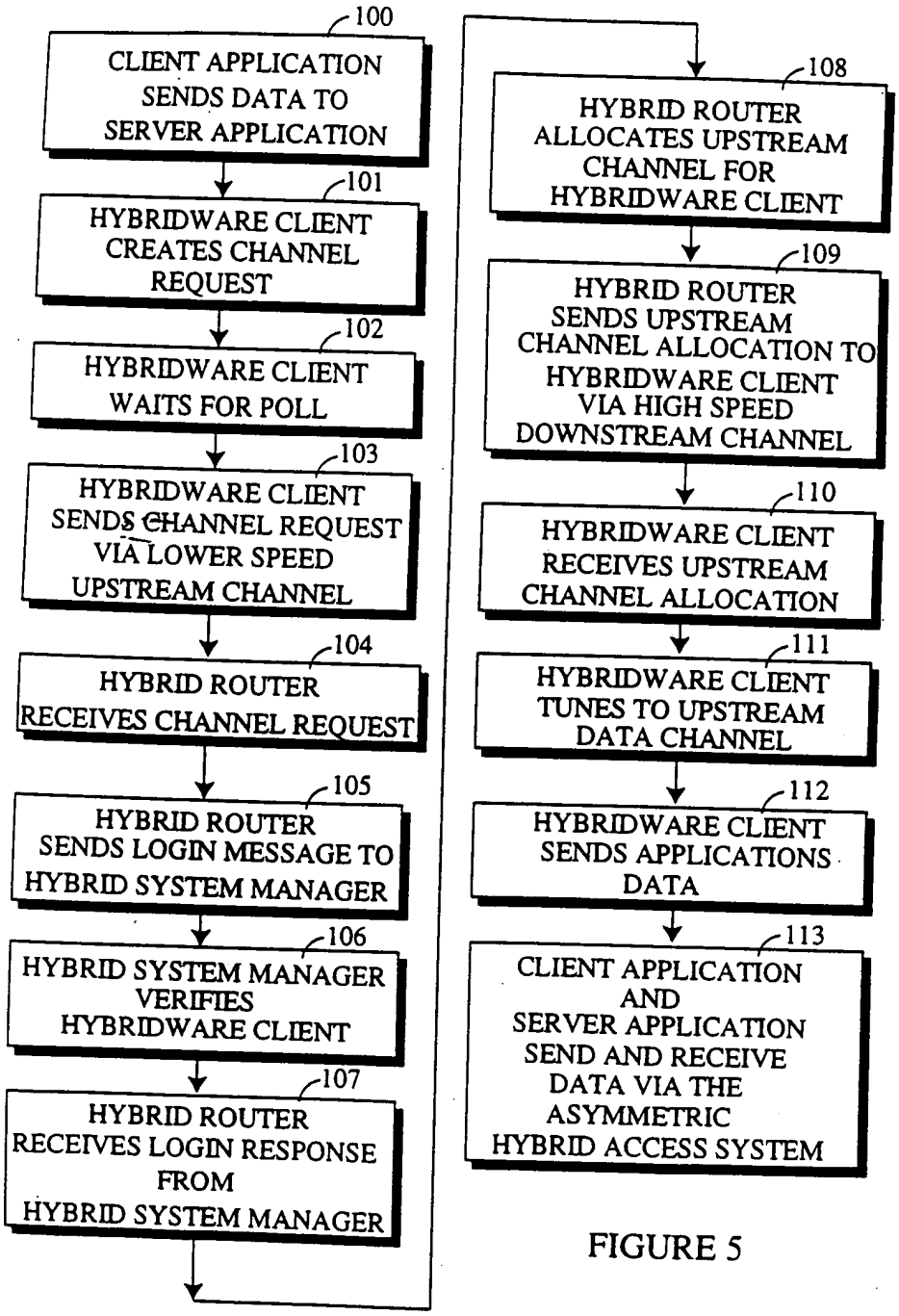
100
CLIENT APPLICATION SENDS DATA TO SERVER APPLICATION
101
HYBRIDWARE CLIENT CREATES CHANNEL REQUEST
102
HYBRIDWARE CLIENT WAITS FOR POLL
103
HYBRIDWARE CLIENT SENDS CHANNEL REQUEST VIA LOWER SPEED UPSTREAM CHANNEL
104
HYBRID ROUTER RECEIVES CHANNEL REQUEST
105
HYBRID ROUTER SENDS LOGIN MESSAGE TO HYBRID SYSTEM MANAGER
106
HYBRID SYSTEM MANAGER VERIFIES HYBRIDWARE CLIENT
107
HYBRID ROUTER RECEIVES LOGIN RESPONSE FROM HYBRID SYSTEM MANAGER
108
HYBRID ROUTER ALLOCATES UPSTREAM CHANNEL FOR HYBRIDWARE CLIENT
109
HYBRID ROUTER SENDS UPSTREAM CHANNEL ALLOCATION TO HYBRIDWARE CLIENT VIA HIGH SPEED DOWNSTREAM CHANNEL
110
HYBRIDWARE CLIENT RECEIVES UPSTREAM CHANNEL ALLOCATION
111
HYBRIDWARE CLIENT TUNES TO UPSTREAM DATA CHANNEL
112
HYBRIDWARE CLIENT SENDS APPLICATIONS DATA
113
CLIENT APPLICATION AND SERVER APPLICATION SEND AND RECEIVE DATA VIA THE ASYMMETRIC HYBRID ACCESS SYSTEM

FIGURE 5

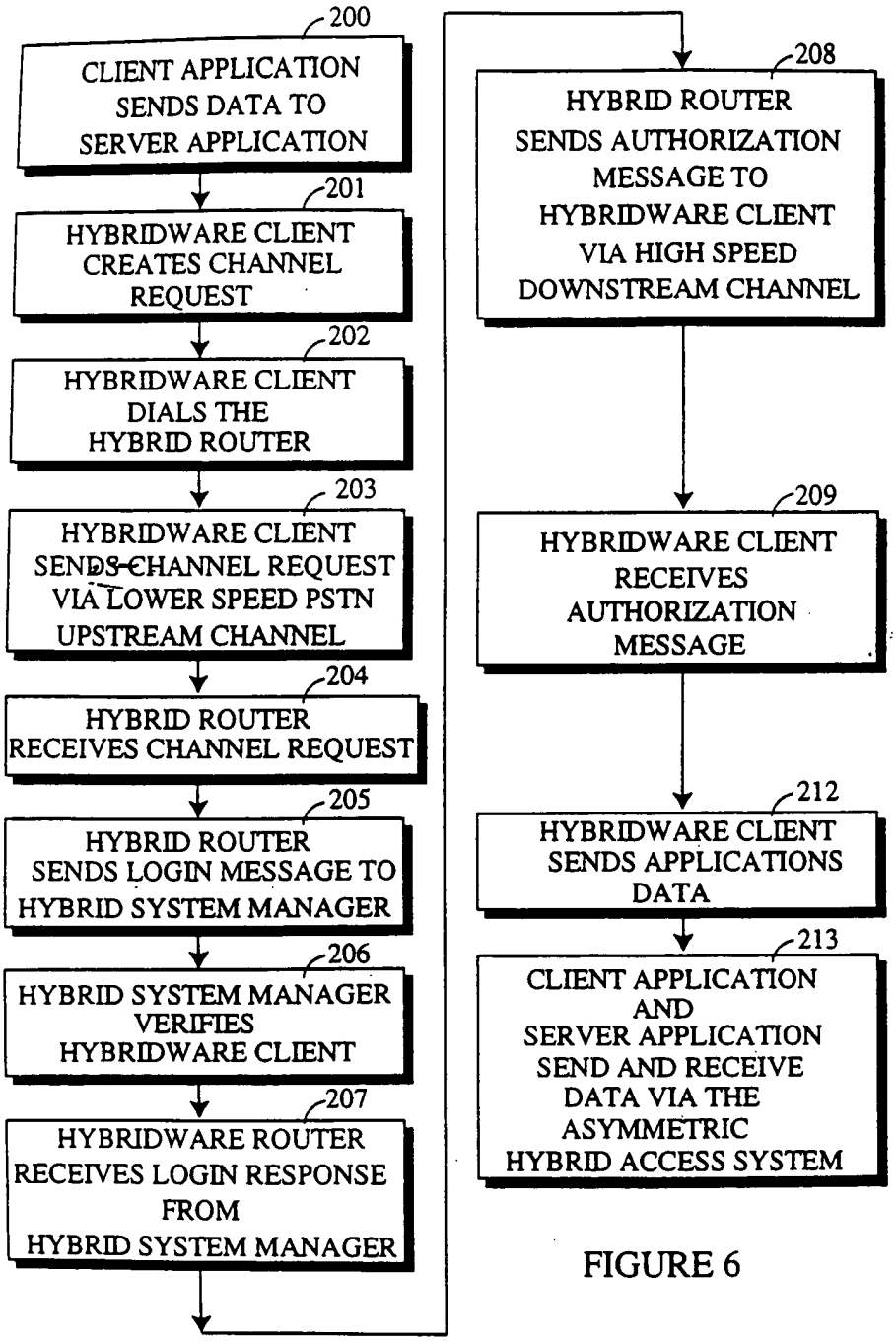
200
CLIENT APPLICATION SENDS DATA TO SERVER APPLICATION
201
HYBRIDWARE CLIENT CREATES CHANNEL REQUEST
202
HYBRIDWARE CLIENT DIALS THE HYBRID ROUTER
203
HYBRIDWARE CLIENT SENDS CHANNEL REQUEST VIA LOWER SPEED PSTN UPSTREAM CHANNEL
204
HYBRID ROUTER RECEIVES CHANNEL REQUEST
205
HYBRID ROUTER SENDS LOGIN MESSAGE TO HYBRID SYSTEM MANAGER
206
HYBRID SYSTEM MANAGER VERIFIES HYBRIDWARE CLIENT
207
HYBRIDWARE ROUTER RECEIVES LOGIN RESPONSE FROM HYBRID SYSTEM MANAGER
208
HYBRID ROUTER SENDS AUTHORIZATION MESSAGE TO HYBRIDWARE CLIENT VIA HIGH SPEED DOWNSTREAM CHANNEL
209
HYBRIDWARE CLIENT RECEIVES AUTHORIZATION MESSAGE
212
HYBRIDWARE CLIENT SENDS APPLICATIONS DATA
213
CLIENT APPLICATION AND SERVER APPLICATION SEND AND RECEIVE DATA VIA THE ASYMMETRIC HYBRID ACCESS SYSTEM

FIGURE 6

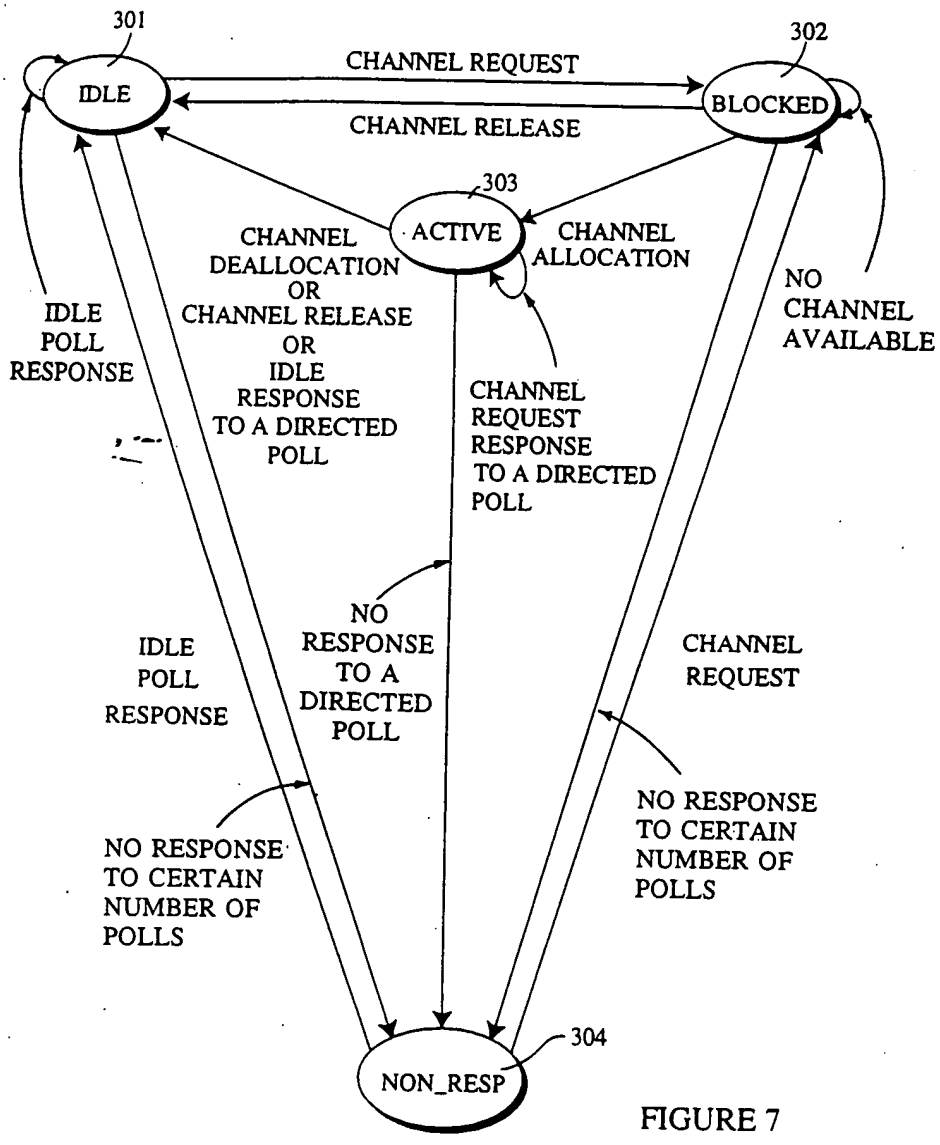
301
IDLE
CHANNEL REQUEST
CHANNEL RELEASE
302
BLOCKED
303
ACTIVE
CHANNEL DEALLOCATION OR CHANNEL RELEASE OR IDLE RESPONSE TO A DIRECTED POLL
CHANNEL ALLOCATION
IDLE POLL RESPONSE
NO CHANNEL AVAILABLE
CHANNEL REQUEST RESPONSE TO A DIRECTED POLL
NO RESPONSE TO A DIRECTED POLL
IDLE POLL RESPONSE
CHANNEL REQUEST
NO RESPONSE TO CERTAIN NUMBER OF POLLS
NO RESPONSE TO CERTAIN NUMBER OF POLLS
304
NON_RESP

FIGURE 7

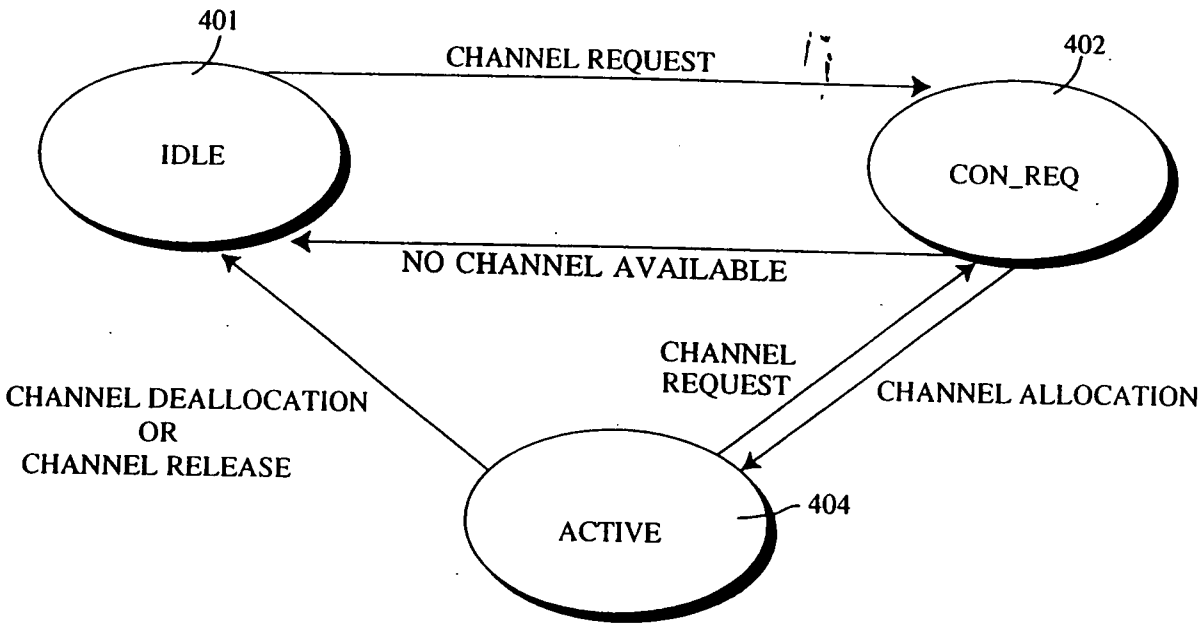

FIGURE 8

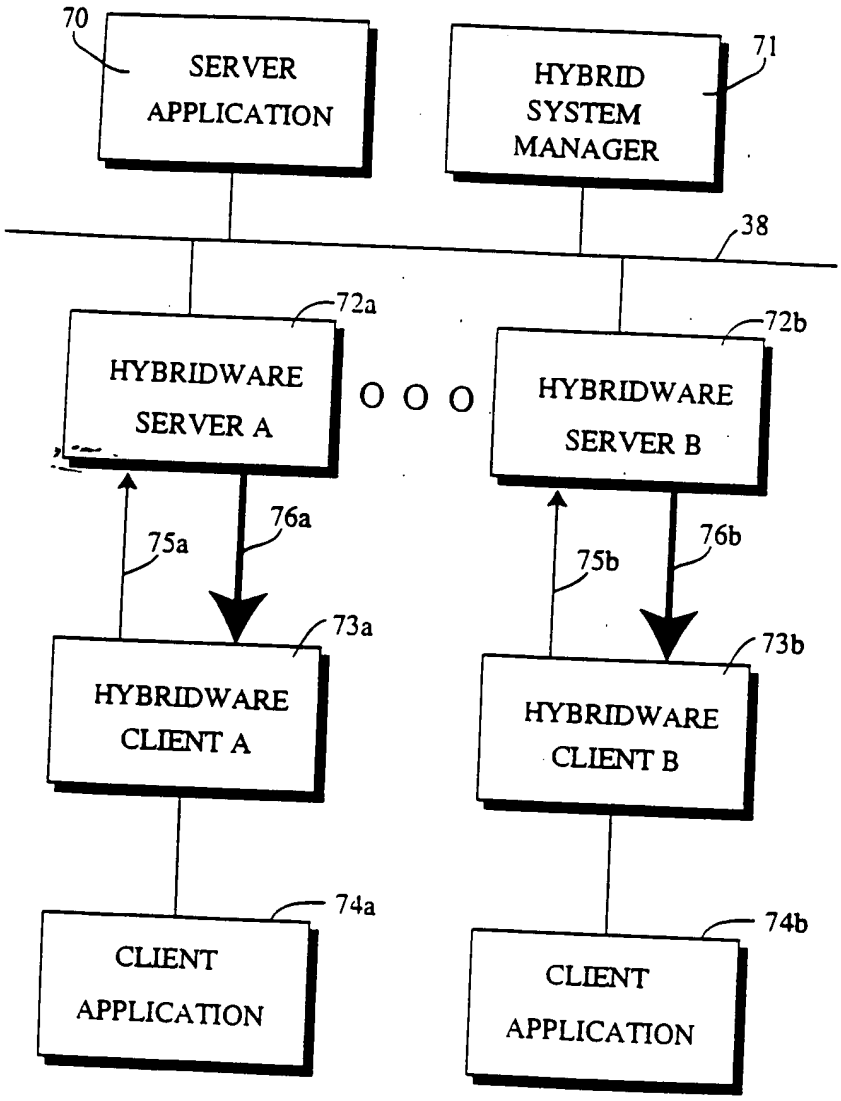
70
SERVER APPLICATION
HYBRID SYSTEM MANAGER
71
38
72a
HYBRIDWARE SERVER A
O O O
72b
HYBRIDWARE SERVER B
75a
76a
75b
76b
73a
HYBRIDWARE CLIENT A
73b
HYBRIDWARE CLIENT B
74a
CLIENT APPLICATION
74b
CLIENT APPLICATION

FIGURE 9

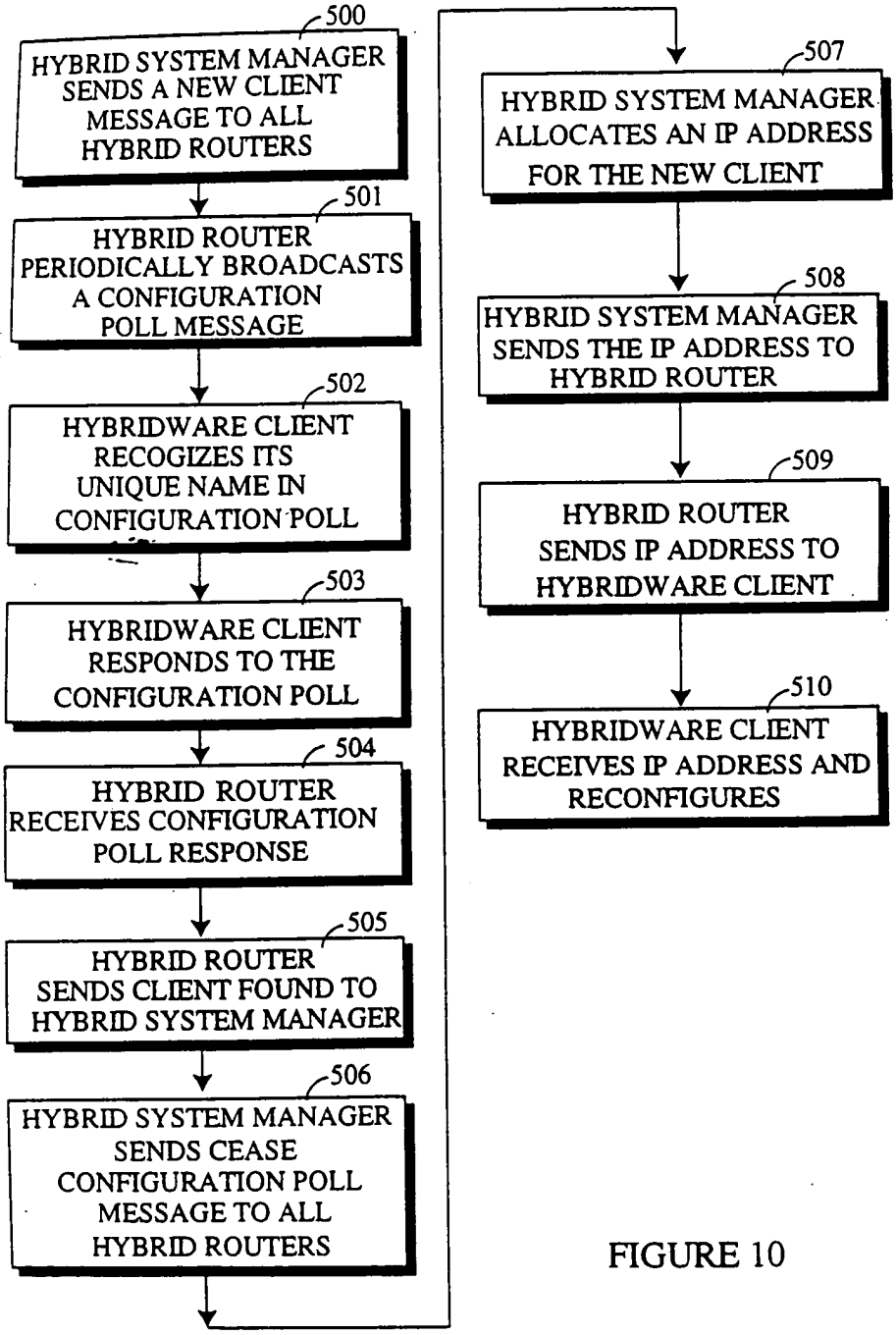
500
HYBRID SYSTEM MANAGER SENDS A NEW CLIENT MESSAGE TO ALL HYBRID ROUTERS
501
HYBRID ROUTER PERIODICALLY BROADCASTS A CONFIGURATION POLL MESSAGE
502
HYBRIDWARE CLIENT RECOGIZES ITS UNIQUE NAME IN CONFIGURATION POLL
503
HYBRIDWARE CLIENT RESPONDS TO THE CONFIGURATION POLL
504
HYBRID ROUTER RECEIVES CONFIGURATION POLL RESPONSE
505
HYBRID ROUTER SENDS CLIENT FOUND TO HYBRID SYSTEM MANAGER
506
HYBRID SYSTEM MANAGER SENDS CEASE CONFIGURATION POLL MESSAGE TO ALL HYBRID ROUTERS
507
HYBRID SYSTEM MANAGER ALLOCATES AN IP ADDRESS FOR THE NEW CLIENT
508
HYBRID SYSTEM MANAGER SENDS THE IP ADDRESS TO HYBRID ROUTER
509
HYBRID ROUTER SENDS IP ADDRESS TO HYBRIDWARE CLIENT
510
HYBRIDWARE CLIENT RECEIVES IP ADDRESS AND RECONFIGURES

FIGURE 10

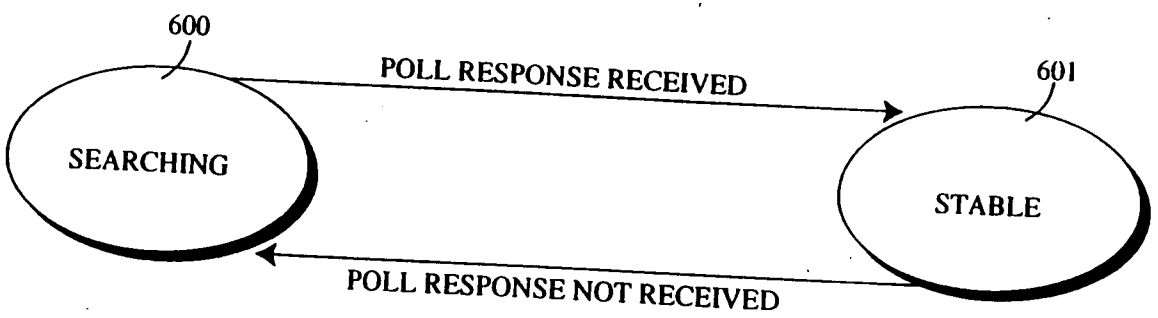

FIGURE 11

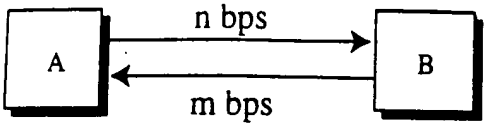

FIGURE 12a
PRIOR ART

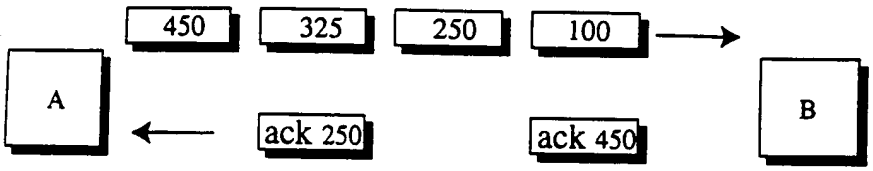

FIGURE 12b
PRIOR ART

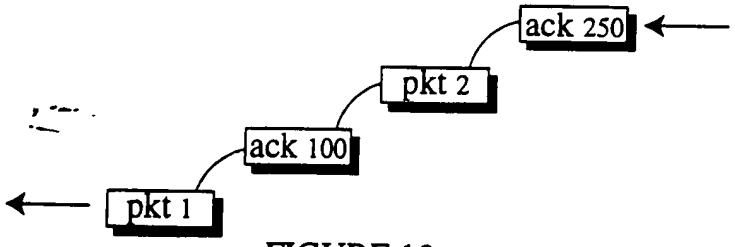

FIGURE 12c

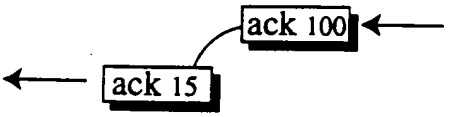

FIGURE 12d

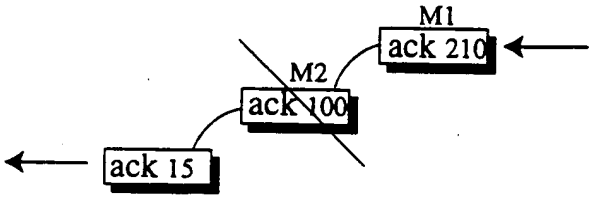

FIGURE 12e

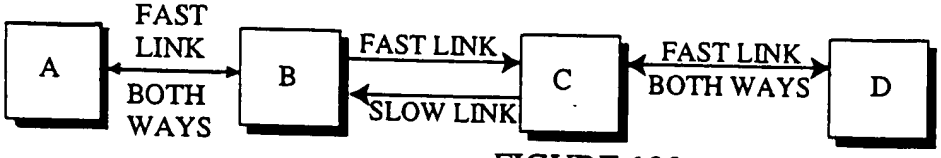

FIGURE 12f

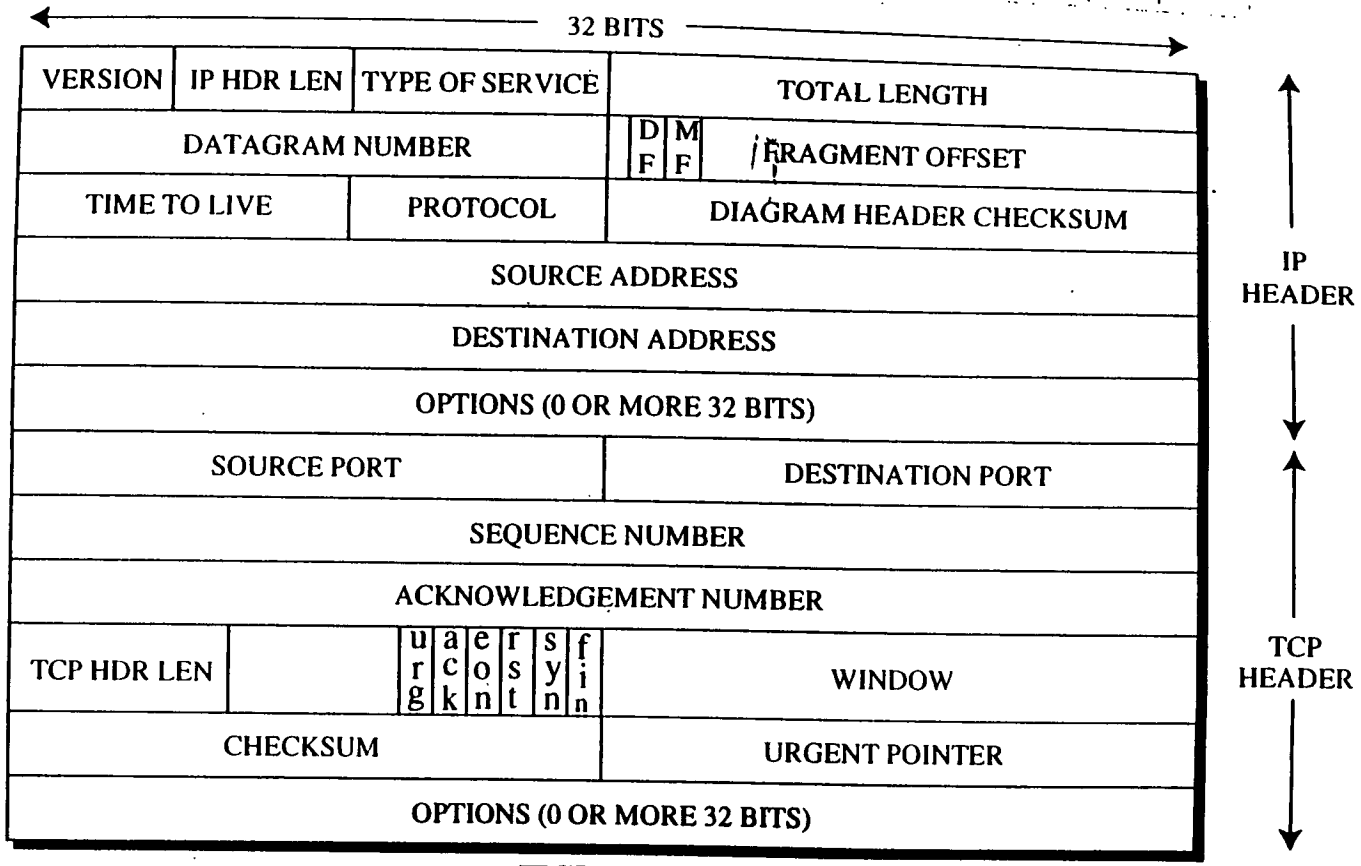

FIGURE 13

H0000215

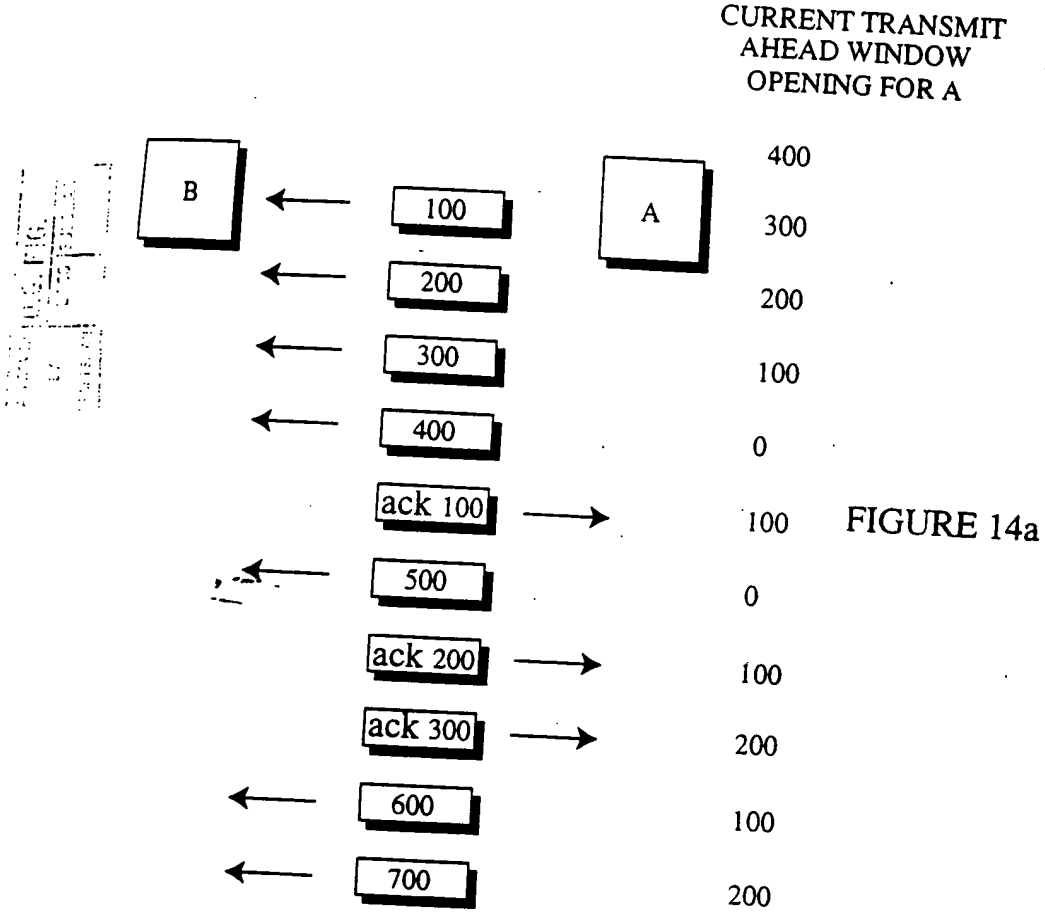

FIGURE 14a

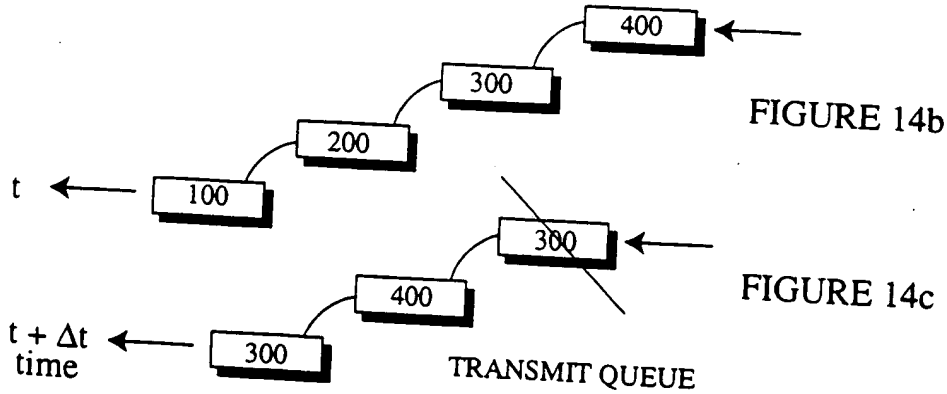

FIGURE 14b

FIGURE 14c

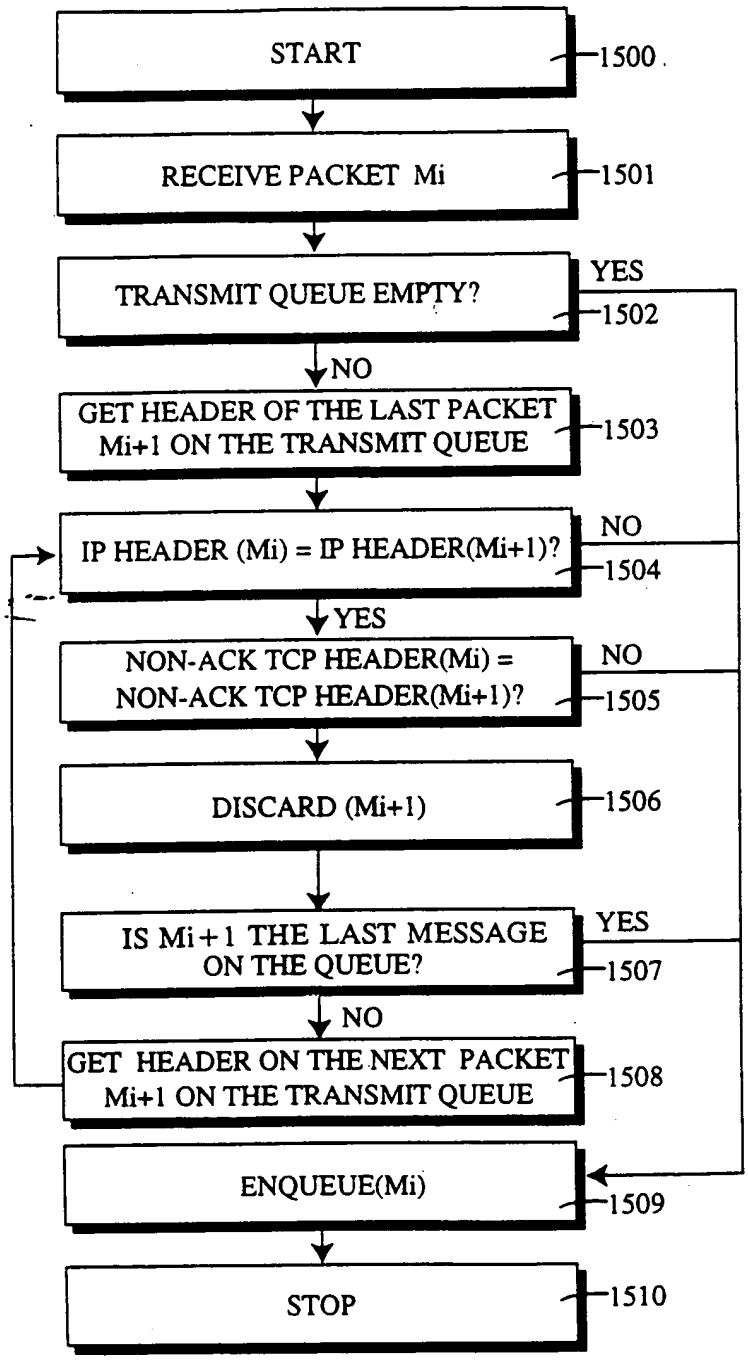
START
1500
RECEIVE PACKET Mi
1501
TRANSMIT QUEUE EMPTY?
YES
1502
NO
GET HEADER OF THE LAST PACKET Mi+1 ON THE TRANSMIT QUEUE
1503
IP HEADER (Mi) = IP HEADER(Mi+1)?
NO
1504
YES
NON-ACK TCP HEADER(Mi) = NON-ACK TCP HEADER(Mi+1)?
NO
1505
DISCARD (Mi+1)
1506
IS Mi+1 THE LAST MESSAGE ON THE QUEUE?
YES
1507
NO
GET HEADER ON THE NEXT PACKET Mi+1 ON THE TRANSMIT QUEUE
1508
ENQUEUE(Mi)
1509
STOP
1510

FIGURE 15

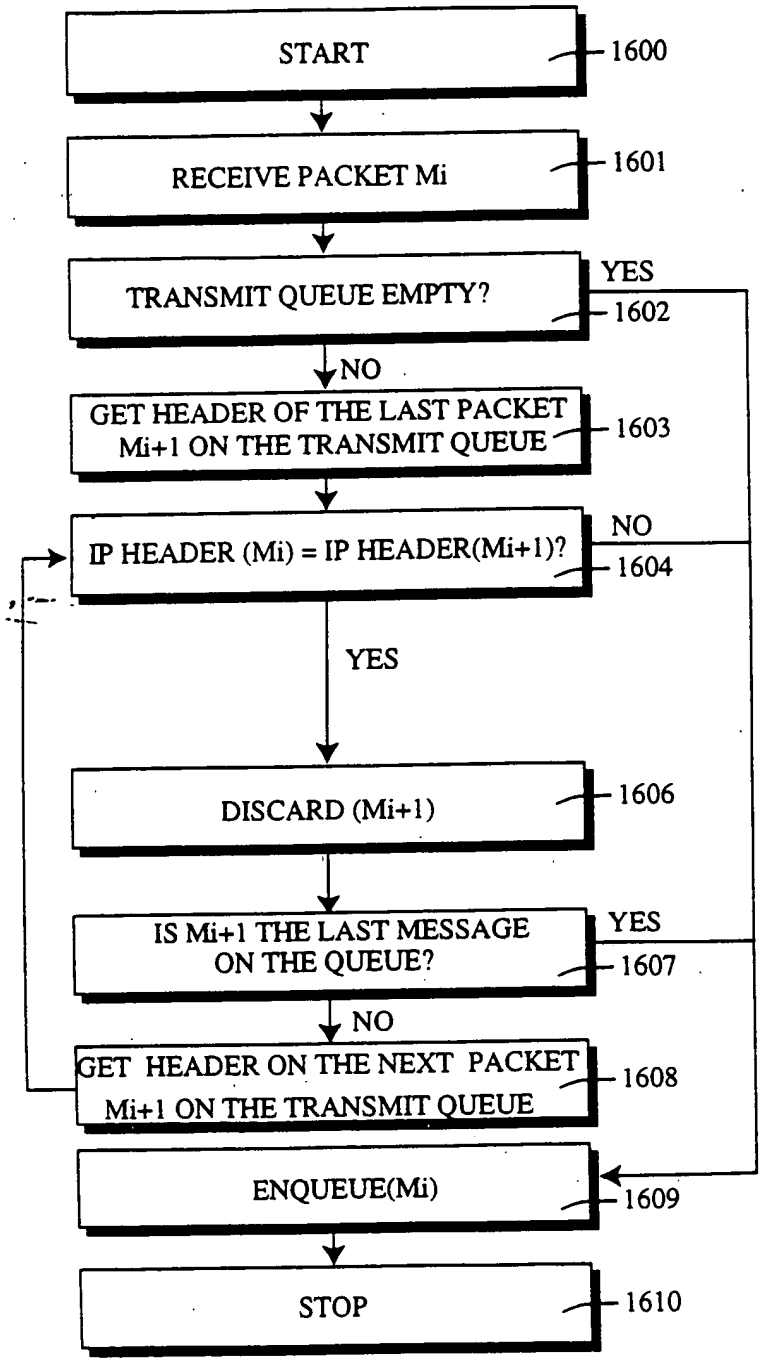
START
1600
RECEIVE PACKET Mi
1601
TRANSMIT QUEUE EMPTY?
YES
1602
NO
GET HEADER OF THE LAST PACKET Mi+1 ON THE TRANSMIT QUEUE
1603
IP HEADER (Mi) = IP HEADER(Mi+1)?
NO
1604
YES
DISCARD (Mi+1)
1606
IS Mi+1 THE LAST MESSAGE ON THE QUEUE?
YES
1607
NO
GET HEADER ON THE NEXT PACKET Mi+1 ON THE TRANSMIT QUEUE
1608
ENQUEUE(Mi)
1609
STOP
1610

FIGURE 16

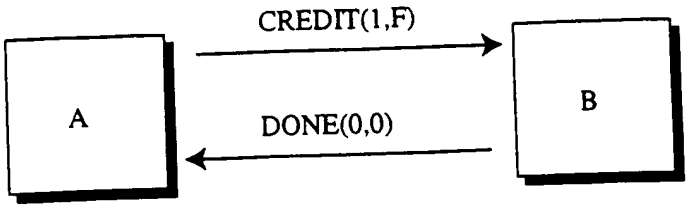

FIGURE 17

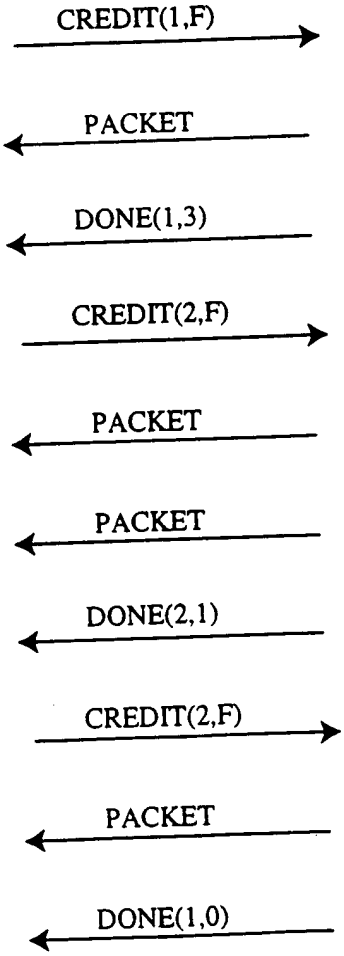

FIGURE 18

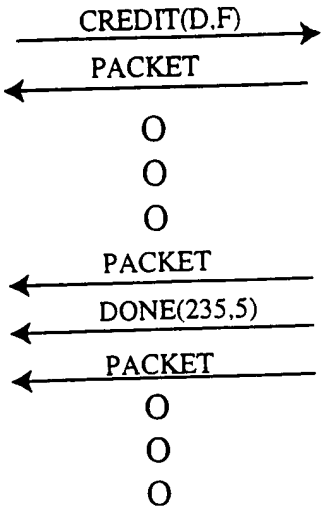

FIGURE 19

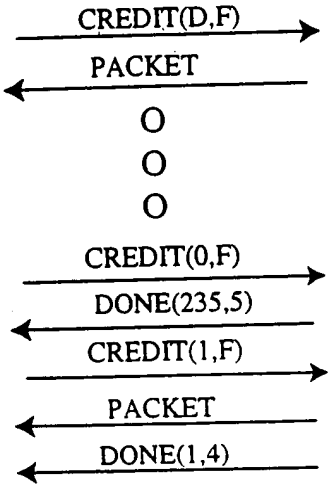

FIGURE 20

16

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION of
Inventor(s): Moura, et al.

Appln. No. 0 8 / 426,920

Group Art Unit:: 2603

Filed: 04/21/95

Examiner: Hom, S.

Title: Asymmetric Hybrid Access System and Method

Batch No. Z99

Date: September 25, 1996

REQUEST FOR INSPECTION AND COPY OF DOCUMENTS IN PATENT AND TRADEMARK OFFICE FILE

Hon. Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

It is respectfully requested that John Ballard, Commercial Draftsman, 500 9th Street, SE, Washington, DC 20003 (202) 543-8126 and/or his staff and employees be allowed to inspect and make copies of any and all documents in the Patent and Trademark Office file of the above-entitled application.

Respectfully submitted,

CUSHMAN DARBY & CUSHMAN

By_____
Atty: Lawrence Harbin
Reg. No. 27,644
Tel.: (202) 861-3716
Fax.: (202) 822-0944

Ninth Floor, East Tower
1100 New York Avenue, N.W.
Washington, D.C. 20005-3918
Telephone: 861-3000

C# 7225/ M# 217537

Atty/Sec:

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RL FIII

CDC-137 8/94

PTO UTILITY GRANT

Paper Number 17

The United States of America

The Commissioner of Patents and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

Bruce Lehman

Commissioner of Patents and Trademarks

Marjorie V Turner

Attest

Form PTO-1584 (Rev. 5/98)

H0000222

(RIGHT INSIDE)

EARCHED

Class	Sub.	Date	Exmr.
370	95.2	3-21-96	SH
	94.1		
	85.13		
	60		
	61		
	37		
379	96	3-22-96	SH
	97		
	98		
	105		
455	5.1		
348	12,13		
Updated	Search	8-28-96	SH
370	24		
	79,94.2		
379	202		

INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.
370	24,37	8-28-96	SH
	60,61		
	79,85.13		
	94.1,94.2		
	95.2		
379	96,97		
	98,105		
	202		
455	5.1		
348	12,13		

SEARCH NOTES

	Date	Exmr.
APS Search	3-21-96	SH
Internet Search	3-21-96	SH
EIC Search	3-22-96	SH
Consulted with Wing Chan on 379 Search	3-22-96	SH

(RIGHT OUTSIDE)

H0000224

08/426920

PATENT APPLICATION

08426920

APPROVED FOR LICENSE
MAY 1 1 1953

CONTENTS

Date Entered or Counted			Date Received or Mailed
	1.	Application 20 papers.	
	2.	Power Att	8-28-95
	3.	Petition to make Special	Jan 18 1996
	4.	Petition Granted	2-23-96
4-1	5.	Rej (3 mos)	4-4-96
	6.	Revocation/Power of Attorney (WE)	7/25/96
	7.	Notice of Non Acceptance	8/7/96
	8.	Amdt + B + Ext of Time (1)	Aug 5 1996
	9.	Disclosure Statement	Aug 5 1996
	10.	Supp Amdt + C	Aug 16 1996
	11.	Ltr to Draftsman	Aug 16 1996
	12.	Revocation/Power of Attorney	8/21/96
	13.	Notice of Acceptance	8/29/96
	14.	Examiner's Interview Summary	8-28-96
9-3	15.	Examiner's Amdt D	09.05.96
	16.	Power to inspect	9-26-96
	17.	PTO ... DEC 17 1996	
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(FRONT)

H0000225

POSITION		ID NO.	DATE
CLASSIFIER		20	5/4/98
EXAMINER		358	5/29/98
TYPIST		712	6/19/95
VERIFIER		441	6/19
CORPS CORR.			
SPEC. HAND			
FILE MAINT.			
DRAFTING			

INDEX OF CLAIMS

Claim Final	Claim Original	Date 8-26-96	Date 8-28-96
1	1	✓	=
2	2		
3	3		
4	4		
5	5		
6	6	✓	=
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	14		
7	15	✓	=
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Claim Final	Claim Original	Date 8-28-96
38	51	=
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SYMBOLS

✓ ..... Rejected
= ..... Allowed
- (Through numberal) Canceled
+ ..... Restricted
N ..... Non-elected
I ..... Interference
A ..... Appeal
O ..... Objected

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EXHIBIT E

a field in the credit control packet to the number of packets which was sent. If the protocol process at the server does not receive credit status information from the credit control packet within a certain credit time-out, CREDIT_TIMEOUT, in milliseconds, for a certain number of times, FAIL_CNT, consecutively, the remote link adapter is assumed to be in error and is put in a not-responding state (NON_RESP). The overall upstream channel performance of a remote link adapter using a credit channel is lower than a remote link adapter on a sole use upstream channel. If any sole use upstream channel becomes available, this channel is given to the credit remote link adapter that has been waiting the longest for a sole use upstream channel that currently has packets to send.

FIG. **18** is a flow diagram of information exchanges between Hybridware™ server and client, according to conditions in which the client has information to transmit and the server gradually allocates bandwidth to the client. In particular, a node first provides a single credit at a selected frequency F. Then a packet is sent, consuming the credit, followed by a completion message indicating use of one credit and potential for an additional transmission corresponding to three credits. Next, a credit is provided corresponding to two packets at the selected frequency F, which is followed by two packet transmissions and a completion message indicating consumption of two credits and potential for transmission of one more. In response, another double credit is sent, followed by a single packet and an acknowledgment of transmission of one and potential for no more transmissions.

FIG. **19** is a flow diagram of information exchanges between Hybridware™ server and client, according to conditions in which the server allocates the client a dedicated channel, the client transmits data and periodically reports to the server with done messages. In particular, a credit indication dedicating a channel at frequency F is provided, followed by 235 packet transmissions. According to prearrangement, an operability indication in the form of a DONE message is provided at an established time indicating potential for five more packet transmissions. The done message indicates completion of 235 packet transmissions, as an accounting function. Because the channel is dedicated, further packet transmissions are made without specific further credit allocations.

FIG. **20** is a flow diagram of information exchanges between Hybridware™ server and client, according to conditions in which a dedicated channel is converted into a shared channel. In particular, a credit indication code D indicating a dedicated channel at frequency F is provided, followed by transmission of 235 packets and a credit message stopping channel dedication and switching to a credit mode. Responsive to the credit message a DONE signal accounts for the 235 packets transmitted during the dedicated mode and indicates potential for five more transmissions. This is followed by a credit allocation of one at a selected frequency. Thus, one packet is transmitted, followed by a completion indication specifying potential for four more packets to be transmitted.

What is claimed is:

1. A hybrid access system for communication with at least a single data processor in a network, said system comprising:

a local area network which includes a shared medium;

a hybrid system manager in communication with said local area network for transmitting information over said shared medium and for interactively handling transfers of information thereover in accordance with a high speed downstream channel protocol and transfers of lower speed return information in accordance with an upstream channel protocol;

a downstream router in communication with said local area network for transmitting information over said shared medium;

an upstream router in communication with said local area network for receiving information,

a broadcast unit connected to said downstream router, said broadcast unit being capable of point-to-multipoint broadcast links on said local area network;

a downstream channel in communication with said broadcast unit for high speed transmission to said single data processor in communication with said shared medium;

an independent upstream channel in communication with said upstream router, for transmission of information from said data processor at a lower speed than transmission of information on said downstream channel;

at least a single remote link adapter associated with said data processor and being in communication with said upstream and downstream channels; and

at least a single client data processor in communication with said remote link adapter.

2. The hybrid access system according to claim **1**, wherein said independent upstream channel includes a telephone network.

3. The hybrid access system according to claim **1**, wherein said independent upstream channel includes a cable TV network.

4. The hybrid access system according to claim **1**, wherein said independent upstream channel includes a wireless transmission path.

5. The hybrid access system according to claim **1**, wherein said local area network includes a switch and said downstream router and said upstream router.

6. The hybrid access system according to claim **1**, wherein said broadcast unit includes at least one of a group consisting of a cable TV headend, a wireless TV transmitter, a satellite transmitter and a cell site.

7. In a wide area network that includes a host server, a plurality of remote clients, a headend facility, a high speed interface that connects said headend facility with said host server, and a high speed link for transferring downstream data packets, a method of providing high speed remote access from any of a plurality of client processors each connected to said wide area network including high-speed downstream and lower-speed upstream channels controlled by a hybrid system manager and a router, said method including the steps of:

providing said downstream channel that is shared by said plurality of remote clients,

providing at least one independent upstream channel that enables at least one of said remote clients to transmit lower speed return data packets to said host server,

issuing an upstream channel authorization request by a lower speed channel for an upstream data channel currently used by a particular client data processor,

conducting login communications between the router and the system manager,

verifying authorized user status at the system manager.

authorizing specific upstream channel use by high speed downstream channel message, and

sending upstream data over an allocated lower speed upstream channel of the asymmetric network.

8. In a full-duplex asymmetric network communication system for transferring information between a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of the downstream channel, and wherein said network communication system includes a hybrid access system for providing interactive network sessions in downstream and upstream communication channels, a method of transmitting data from an upstream transmit queue in an upstream transmitter node to a selected receiver node located at a receiving end, said method comprising the steps of:

transmitting selected amounts of packet data from a first transmit queue in a first node to a second node wherein said second node includes a second transmit queue for transmitting acknowledgments to a receiver node,

generating acknowledgments of packet data received by said second node,

eliminating from the second transmit queue of the second node packet data acknowledgments which are redundant of other packet data acknowledgments in said second transmit queue, and

filling open transmit queue spaces with additional packet data.

9. In a full-duplex asymmetric network communication system for transferring information between a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of the downstream channel, and wherein said network communication system includes a hybrid access system for providing an interactive network session in downstream and upstream communication channels, a method of dynamically setting remote link adapter power levels in said hybrid access system, comprising the steps of:

transmitting successive indications to a hybrid upstream router at selected different power levels,

confirming receipt of a selected one of said indications, and

setting a level of future transmissions to a power level associated with the selected indication.

10. In a full-duplex asymmetric network communication system for transferring information from a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of the downstream channel, and wherein said network communication system includes a hybrid access system for providing an interactive network session in downstream and upstream communication channels, a method of packet suppression in communication between first and second nodes in said communication system having respective first and second transmit and receive queues, in which information packets having headers are transmitted from said first node to said second node, comprising the steps of:

loading a first information packet into the transmit queue of said first node;

loading a second information packet into the transmit queue of said first node;

checking the headers of said first and second information packets, and responsive to redundancy between the first and second headers, suppressing one of said first and second information packets.

11. In a full-duplex asymmetric network communication system for transferring information from a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of the downstream channel, and wherein said network communication system includes a hybrid access system for simultaneously controlling the downstream and upstream in interactive network sessions, a method of dynamically responding to detected quality levels in a communication channel, comprising the steps of:

detecting a quality characteristic with respect to a selected communication channel from a selected group of quality characteristics each of which is defined by quantitative levels,

determining whether the quantitative level of the detected quality characteristic deviates with respect to a predefined norm, and

dynamically switching to another communication channel, if sufficient deviation is determined.

12. The method according to claim 11 wherein said group of quality characteristics includes time from last operability indication, signal to noise ratio, and error frequency.

13. A network communication system including a server, a plurality of remote clients and an information distribution facility for distributing information signals to said remote clients, said communication system comprising:

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote clients to receive high speed data packets from said server over a shared medium,

at least one independent upstream channel for enabling at least one of said remote clients to transmit lower speed return data packets to said server,

a hybrid access system including a network manager for interactively controlling both transfers of data packets from said server to said remote clients via broadcasts over said shared downstream channel in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said server and said plurality of remote clients, and

said hybrid access system further includes a server interface that enables communication with said server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared media and an upstream router for receiving return data packets from said remote clients.

14. The network communication system as recited in claim 13 wherein said plurality of remote clients include remote link adapters and said downstream router couples said shared medium to establish a physical connection with said downstream channel and said upstream router couples

said remote link adapters to establish a physical connection with said upstream channel.

15. The network communication system as recited in claim 13 wherein said independent upstream channel lies in a communication medium that is different from said downstream channel.

16. The network communication system as recited in claim 13 wherein said shared medium comprises a hybrid fiber coaxial cable and said remote clients physically connect in parallel to said hybrid fiber coaxial cable to receive simultaneously broadcasted data packets whereby to facilitate efficient sharing of resources at said distribution facility by said remote clients.

17. The network communication system as recited in claim 16 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

18. The network communication system as recited in claim 17 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

19. The network communication system as recited in claim 17 wherein said at least one independent upstream channel comprises an independent lower speed channel transmitted over said hybrid fiber coaxial cable, and said upstream router receives said data packets transmitted by said at least one remote client over said independent upstream channel and routes said data packets to said server.

20. The network communication system as recited in claim 13 wherein said distribution facility comprises a cellular broadcast facility, said shared medium comprises radio frequency broadcasts from said cellular broadcast facility, and said remote clients each comprise radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium so as to provide sharing of resources at said distribution facility by said remote clients.

21. The network communication system as recited in claim 20 wherein said at least one independent upstream channel comprises a lower speed cellular return channel routed through said distribution facility.

22. The network communication system as recited in claim 13 wherein said distribution facility comprises a satellite, said shared medium comprises a direct satellite broadcast and said remote clients includes a receiver for substantially simultaneously receiving information signals from said broadcast so as to provide sharing of broadcast resources among said remote clients.

23. The network communication system as recited in claim 22 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

24. The network communication system as recited in claim 13 wherein each of said upstream and downstream channels lies in a communication medium selected from one of a CATV distribution network, a cell site, a radio transmitter station, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

25. The network communication system as recited in claim 13 wherein said distribution facility comprises a television broadcast facility, said shared medium comprises radio frequency broadcasts from said television broadcast facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium whereby to provide sharing of resources located at said distribution facility.

26. The network communication system as recited in claim 25 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

27. The network communication system as recited in claim 26 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

28. The network communication system as recited in claim 13 wherein said distribution facility comprises a radio broadcast facility, said shared medium comprises radio frequency broadcasts from said radio broadcast facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium whereby to provide sharing of resources located at said distribution facility.

29. The network communication system as recited in claim 28 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

30. The network communication system as recited in claim 29 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

31. The network communication system as recited in claim 17 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

32. The network communication system as recited in claim 19 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

33. The network communication system as recited in claim 26 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel whereby to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

34. The network communication system as recited in claim 29 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

35. The network communication system as recited in claim 24 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

36. The network communication system as recited in claim 13 wherein said distribution facility comprises a television broadcast facility, said shared medium comprises radio frequency broadcasts from said television broadcast facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium so as to provide sharing of resources located at said distribution faciiity.

37. The network communication system as recited in claim 36 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

38. The network communication system as recited in claim 36 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

39. In a split-channel asymmetric network communication system including a host server, a plurality of remote clients and a headend facility for distributing information signals to said remote clients, a full-duplex packet delivery system comprising:

a downstream channel that is shared by said plurality of remote clients for receiving high speed data packets from said host server over a shared medium,

at least one independent upstream channel that enables at least one of said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and for controlling transfers of lower speed return data packets from said at least one remote client to said host server over said independent upstream channel in accordance with an upstream channel protocol and in accordance with scheduling information transmitted on the downstream channel, said network manager being further operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients,

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said at least one of said remote clients,

whereby said network communication system provides full-duplex interactive asymmetric communication in a session between said host server and said plurality of remote clients over said shared medium.

40. The invention as recited in claim 39 wherein said network manager schedules assignment of upstream channels for use by said at least one remote client in accordance with at least one of an upstream channel availability signal, a priority status signal, a shared/dedicated channel request signal, or a service level authorization signal.

41. The invention as recited in claim 39 wherein communication media for each of said downstream and said upstream channels is selected from at least one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

42. The invention as recited in claim 41 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel.

43. A network communication system including a host, a plurality of remote users and an information distribution facility for distributing information signals to said remote users, said system comprising:

a downstream channel shared by said remote users for receiving digital information signals transmitted from the host over a shared medium at a high speed,

at least one independent upstream channel for permitting the remote users to transmit digital information to said host at a lower speed than the high speed on the downstream channel,

a hybrid access system for interactively controlling transfers of digital information from said host to the remote users via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and for controlling transfers of digital information from said remote clients to said host at said lower speed over said at least one independent upstream channel in accordance with an upstream channel protocol, said hybrid access system being operable to provide full-duplex point-to-multipoint communication between said host and said remote users, and

said hybrid access system further including an interface for connecting with the host, a downstream router for enabling transmission of high speed information to said remote users over said shared medium and an upstream router for receiving return information from said remote users.

44. The network communication system as recited in claim 43 wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

45. The network communication system as recited in claim 44 wherein said upstream channel protocol enables operation of said upstream channel at multiple speed and said hybrid access system selectably controls speeds of data transfers on said upstream channel.

46. The network communication system including a host server, a plurality of remote clients and a headend facility for distributing data packets to said remote clients, said system comprising:

a downstream channel that is shared by said plurality of remote clients for receiving high speed data packets from said host server over a shared medium,

at least one independent upstream channel that permits said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol, and for controlling transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel located on a physical medium that is different from shared medium of said downstream channel, said upstream communication channel being assigned in accordance with an upstream channel protocol and scheduling information transmitted on the downstream channel, said network manager being further operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients,

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

47. The network communication system as recited in claim **46** wherein said hybrid access system effects control of assignment of upstream channels to said remote clients in accordance with scheduling information including a dedicated or shared channel request signal, a channel availability signal, a priority status signal or class of service signal.

48. The network communication system as recited in claim **47** wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

49. The network communication system as recited in claim **48** wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel.

50. A client-server system including a split-channel asymmetric network for enabling multiple users to share information, said system comprising:

a host server,

a plurality of remote users,

a distribution facility for distributing information signals to said remote users,

a downstream channel that is shared by said plurality of remote users so as to enable said plurality of users to receive high speed data packets from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote users to transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system for interactively controlling both transfers of data packets from said host server to said remote users via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote users to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote users in an interactive session wherein transmission of upstream information is controlled, in part, by control information transmitted over said downstream channel, and

said hybrid access system further including a host interface that enables communication with said host server, a downstream router for enabling transmission of high speed data packets to said remote users over said shared medium and an upstream router for receiving return data packets from said remote users.

51. In combination with a multi-user computer system including at least one host computer and a plurality of remote clients, the improvement comprising:

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote clients to receive high speed data packets from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a speed that is lower than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for interactively controlling both transfers of data packets from said host server to said remote clients via broadcasts over said shared medium that communicates with said plurality of remote clients in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

52. In combination with a CATV broadcast transmission facility including a shared medium downstream channel that is shared by a plurality of remote clients to receive high speed data packets from a host server, the improvement comprising:

respective RLA devices associated with said remote clients that are connected with said shared medium and tuned so as to receive high speed transfers of data packets for conveyance to said remote clients,

at least one independent upstream channel that enables said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for interactively controlling both transfers of information data packets from said host server to said remote clients via broadcasts over said shared medium that communicates with said plurality of remote clients in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multi-

point communication between said host server and said plurality of remote clients in an interactive session wherein transmission of upstream information is monitored or controlled, in part, by control information transmitted through said downstream channel, and

said hybrid access system further including an interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients,

whereby said improvement acts to provide full-duplex interactive asymmetric communication in a session between said host server and said plurality of remote clients through said CATV broadcast transmission facility over said shared medium.

53. The network communication system as recited in claim 52 wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

54. The network communication system as recited in claim 53 wherein said upstream channel protocol enables operation of said upstream channel at multiple speed and said hybrid access system selectably controls speeds of data transfers on said upstream channel.

55. In combination with a television signal broadcast facility, the improvement comprising:

a host computer,

a plurality of remote clients,

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to permit said plurality of remote clients to receive high speed data packets from the host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and for receiving transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

56. In combination with a television signal broadcast facility, a network of host computers and a plurality of remote clients, the improvement comprising:

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote clients to receive high speed data packets from the host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for controlling both transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

57. In an asymmetric network communication system including a host server and a plurality of remote clients wherein respective remote clients have associated remote link adapters that operate in accordance with predefined downstream and upstream protocols, said system including:

a headend facility that distributes information signals,

a downstream channel that is shared by said plurality of remote clients so as to permit said plurality of remote clients to receive high speed information signals from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel to enable at least one of said remote clients to transmit return information signals to said host server at a lower speed than said information signals transmitted over said downstream channel,

a hybrid access system for controlling transfers of information signals transmitted from said host server to said remote clients over said shared medium in accordance with said downstream protocol and for monitoring communication over said independent upstream channels thereby to provide interactive communication between said host server and at least one of said plurality of remote clients over said downstream and upstream communication channels, and

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed information to said remote clients over said shared media,

whereby said asymmetric network communication system provides full-duplex interactive asymmetric communication between said host server and said at least one of said plurality of remote clients in a shared medium environment.

58. A packet delivery system for use in an asymmetric network to provide full-duplex communication, said system including a host server and at least one remote client that has a remote link adapter operating in accordance with a high speed downstream and a lower speed upstream protocol, said packet delivery system comprising:

a downstream channel that is shared by said at least one remote client so as to enable said at least one remote

client to receive high speed data packets from said host server over a shared medium,

at least one independent upstream channel that enables said remote client to transmit lower speed return data packets to said host server,

a hybrid access system for controlling transfers of data packets from said host server to said remote client over said shared medium in accordance with said downstream channel protocol and for monitoring communication over said independent upstream channel thereby to schedule upstream communication in accordance with predefined rules, and

said hybrid access system further including an interface that enables connection with said host server and a downstream router for enabling transmission of high speed data packets to said remote client over said shared media.

59. A packet delivery system as recited in claim **58** wherein said hybrid access system effects control of assignment of upstream channels to said remote client so as to assign either a shared channel or dedicated channel to a remote client.

60. A packet delivery system as recited in claim **59** wherein said hybrid access system effects switching of channel assignments among said remote client between shared and dedicated upstream channels.

61. The method as recited in claim **7** further including the step of providing said independent upstream channel on a medium different from a physical medium of said downstream channel.

* * * * *

EXHIBIT F

KEEP ON TOP UNTIL APPLICATION IS FILED

REQUEST FOR CASE DOCKET SUB-MATTER NUMBER

Date: 9/6/94

Date Disclosure Received From Client: 7/14/94

Client Name: Hybrid Networks, Inc.

Client No.: 18323 Alpha: HYBR

Responsible Attny.: ACS Working Attny.: ACS

Full Inventor(s) Name: Ed Mauro

Title of Disclosure: Hybrid Access System

if not disclosure then the case is a:

CIP_____ DIV_____ FWC_____
Of Case_____

If File Is Transferred To Fenwick & West,

Filing Date:_____ Serial No.:_____ Pat. No.:_____

Title:_____

NEW CASE AND SUB MATTER NO: 1572 ; 18323-01572

Karyl, *please prepare a new case memo for the above matter.*

Deadline to File Application: Per ACS - no deadline
(will be docketed 3 months from Request Date unless otherwise stated)

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EXHIBIT G

Hybrid Networks, Inc.

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Hybrid Access System and Related Inventions Patent Application

Background of the Inventions

These inventions relate to a system used to extend a high-speed backbone network such as the Internet or centrallized local multimedia content to any remote location using a "hybrid" asymmetric architecture. The Hybrid Access System (HAS) splits the full-duplex communications path between the central site and remote site into two separate communications links. In certain configurations, the upstream link can use a separate medium from the downstream link and each link can operate independently of one another, at different speeds and with independent protocols. In other configurations, both the upstream and downstream links can share the same physical medium while operating at different speeds and with independent protocols.

At the present time, most data communication networks use symmetric communications paths between the transmit and receive sites and vice versa. Other networks use a broadcast only path, but today no network is capable of combining the flexibility of full-duplex symmetric point-to-point networks with the cost effectiveness of broadcast only networks. The HAS and its related inventions can extend the high-speed backbone network and the local multimedia content to remote sites at high-speeds and affordable costs while maintaining the full interactive duplex characteristics of symmetric networks. The HAS will initially use contiguous bandwidth in standard 6Mhz TV channels in the downstream direction, but it could also use other high-bandwidth broadband services in the downstream direction which could include HDTV or any other low-cost, high-speed broadband modem. The HAS will initially use standard telephone lines and cable TV narrow band sub-split sub-channels in the upstream direction, but it can also use other return channels including ISDN, radio or any other low-cost, low-to-medium speed modems. The HAS is unique because it can mix and match many different combinations of downstream and upstream channels. No other system is capable of providing the same level of flexibility.

There have been previous attempts to provide asymmetric data communications systems. Some of this work included modems with very low speed return channels and systems that combined a low speed radio broadcast channel with telephone return lines. However, none of these systems was capable of extending multimedia content and on-line

information services to remote locations at high-speeds. All other documented asymmetric work done in the past used low speed links. The HAS invention is unique when compared to previous art. It is the only high-speed asymmetric network system of its kind that is capable of combining any given high-speed dowstream channel with any other completely separate upstream channel to form a two-way, high-speed data communications system.

Specific components of the HAS include the information sources (On-line Information Providers, Corporations, Government Agencies, Universities, Libraries and others), the backbone networks, the Hybrid Transmission Facility (HTF), Point of Presence (PoP) sites and the HAS link which includes the following sub-components: the high-speed links to connect the PoP site to the CATV head-end, TV transmitter site or cell-site, the CATV head-end site, the TV transmitter site or cell-site, the downstream channel, the remote user site and finally, the independent upstream channels.

Summary of the Inventions

The various HAS inventions described and claimed here are related to different aspects of the HAS operation. Some of the HAS related inventions deal with specific protocols and protocol enhancements done to the downstream and upstream transmission links when operating in an environment like the HAS. Other HAS related inventions deal with specific functions and enhancements implemented within the Hybrid Router products and with the system itself.

The Hybrid Access System (HAS)

The HAS is a unique system that combines two or more independent simplex channels to create a full-duplex data transmission system. The various independent transmission channels are controlled from the HTF or PoP. Throughout this document, HTF and/or PoP will be used interchangeably and will mean the same thing. At the remote site, Remote Link Adapters (RLAs), patent # 5,347,304 are used to recombine the independent transmission channels. The RLAs use the Hybrid Protocols to talk to the HTF. RLAs can only talk to each other via the PoP. A PoP interconnects multiple cable TV head ends and TV transmitters or cell sites via high speed lines (see Fig. 1). The independent upstream transmission channels connect back to the PoP either through a separate medium or through the same medium. The following are illustrative examples of different HAS configurations. This does not exclude other HAS configurations:

1. A HAS configuration which uses downstream cable TV channels and upstream PSTN or ISDN telephone lines;

2. A HAS configuration which uses downstream wireless TV channels and upstream PSTN or ISDN telephone lines;

3. A HAS configuration which uses both downstream and upstream cable TV channels.

The HTP/PoP contains Hybrid Routers and the Hybrid Network Management Station (HNMS). These are the main central site (i.e., server) building blocks of the HAS. Hybridware™ server software runs on Hybrid Routers. This server software implements Hybrid Protocols, the specific asymmetric system enhancements (i.e, HAS related inventions) and the rest of the control and data transmission system. The remote site HAS building block is the RLA. Hybridware™ client software runs on the RLAs. This client software also implements Hybrid Protocols, the specific asymmetric system enhancements (i.e, HAS related inventions) and the rest of the control and data transmision system. The HAS can be characterized as a unique client-server network system.

Ack Suppression

The first of the specific HAS related inventions being described here is the invention of "ack suppression". Consider two systems A and B connected by two independent, simplex communications links like the HAS. Let us assume that the transfer rate from A to B is m bps and that the transfer rate in the opposite direction is n bps where $n > m$. Further assume that the two systems communicate using a protocol which requires that the system receiving data has to acknowledge the receipt of either data packets or data bytes contained in incoming packets (see Fig 4a and 4b). Let us also assume that the protocol uses the following acknowledgement scheme. The acknowledgement of byte number k indicates that all bytes prior to k have been received (similarly acknowledgement of packet number k acknowledges receipt of all previous packets). The numbers on the data packets indicate the position of the last data byte of the packet in the data stream and the acknowledgement numbers indicate that all the bytes of the data stream up to and including the byte indicated by the ack have been correctly received.

If system B generates and system A receives the data and the rate of incoming data is sufficiently large and the size of acknowledgements is sufficiently large, then the link from A to B will not be able to send all the acknowledgements out in time and the transmit queue in A will grow. Implementing the ack suppression method consists of discarding redundant acknowledgements from the lower speed transmit queue.

Packet Suppression

The second of the specific HAS related inventions being described here is the invention of "packet suppression". Consider two systems A and B connected by two independent, simplex communications links like the HAS. Let us assume that the transfer rate from A to B is m bps and that the transfer rate in the opposite direction is n bps where $n > m$. Let us also assume that the protocol uses the following acknowledgement scheme. The acknowledgement of byte number k indicates that all bytes prior to k have been received (similarly, acknowledgement of packet number k acknowledges receipt of all previous packets). Let us now assume that the protocol transmits a certain amount of data (packets) called the transmit-ahead-window or window, and then awaits packet acknowledgements. As a packet acknowledgement arrives, the transmit-ahead-window opens up to the extent that was acknowledged by the receiving system. If system A generates large packets, and if the transmission rate from A to B is sufficiently low, then the time-out value might be insufficient and retransmission might occur even though the original packet has never left system A (see Fig.6). Implementing the packet suppression scheme consists of searching the transmit queue and throwing out packets that carry information which is identical to that in a packet which is already present in a previously enqueued packet (see Fig.6).

Hybrid Protocols

The third of the specific HAS related inventions being described here is the invention of the Hybrid Protocols. These protocols can be organized in the following categories:

1. Automatic address allocation and configuration protocol. This protocol uses a unique discovery scheme to identify remote users. Prior art includes RARP, bootp and Netbios. This Hybrid protocol differs from the prior art in many significant ways. First, the remote HAS user is given an abstract name; say "Bob". Second, the name is registered by the operator on the HNMS database. Then, all the Hybrid

Downstream Routers (HDRs) start broadcasting for that name such that a response from the appropriate user/RLA can uniquely determine where the name resides. Once the node associated with the name is determined (based on the response message from the RLA), an address (e.g., IP address) is allocated and delivered to the remote user. This protocol uses broadcast. In contrast, other Hybrid Protocols use direct polls (e.g., upstream channel allocation).

2. Prioritized Polling Protocol. This protocol allows the Hybrid Routers to communicate with the RLAs via a prioritized polling scheme. There are other types of polling protocols in prior art. However, the Hybrid Protocol differs from prior art in many significant ways. Various RLAs can be at different status like configuring, idle (when responding to polls), not responding (i.e., off-line, bad reception or dead), requesting a channel, active (have been assigned a dedicated upstream channel for data transmission) or credit active (are sharing an upstream data channel). The Hybrid Upstream Routers (HUR), which implement this protocol, prioritize the polling based on the prior knowledge of the status of the RLAs (i.e., results from the previous polls). For example, RLAs that are idle are polled more frequently than RLAs that do not respond. In addition, if several RLAs are in the same state (e.g., requesting channels, active or credit active), the HUR will assure fairness by assigning upstream channels to RLAs that waited the longest or to RLAs that have the highest class of service. Credit active RLAs are also given fair treatment. Finally, RLAs with dedicated active channels will also be monitored but not polled. Used channels may revert back to unused if data transmission stops for a certain time interval. These channels will then be allocated to another RLA that is requesting a channel.

3. Automatic Gain Adjustment Protocol. This protocol allows the RLAs to adjust the transmit power level based on feedback from a poll from the HUR. The RLA starts transmitting at the lowest level until the HUR tells it that it heard from the RLA. The RLA's transmit level is then set to a level that corresponds to the best estimated level for that particular transmitter.

4. Upstream Channel Allocation Protocol. This protocol is responsible for the allocation of upstream channels to RLAs. In one of its configurations, the HAS can use multiple narrowband, point-to-point, cable TV upstream channels. The upstream modulator on the RLAs is frequency agile and can be instructed to tune to

a wide range of those narrowband upstream channels. If the HUR determines that it has available upstream channels, then the best quality channels are first assigned to the RLAs on a first come first serve basis. In other words, upstream channel assignment is based on the most recent demand. Provision for priority assignments, based on quality of service are also possible. If all the channels are busy, then the HUR waits until upstream channels become available to assign them to RLAs that are queued up with requests for upstream channels. There are two timeout mechanisms for RLAs to release an upstream channel. The first timeout is as follows: If an RLA stops transmitting for 2 to 10 seconds, then that RLA might be bumped to a credit channel (see below), by releasing the dedicated channel for a more active RLA. With the second timeout, if the RLA stops transmitting for a number of minutes, then it will lose its upstream channel and it will be placed in an idle, non-active mode. Once channels are allocated to RLAs, then the RLAs are not polled anymore. However, the active RLAs are responsible for sending a heartbeat message to the HUR telling it that they are alive and well. If everything is fine (i.e., the server protocol process is hearing the RLA heart beats), then that particular channel is assumed to be of good quality. If not, then the channel is assumed to be bad. Bad channels are automatically disabled if they are determined to be bad several times in a row when trying to assign them to more than one RLA. The channel allocation algorithm reassigns the best channels which are properly released. Those channels are allocated first. The worst channels are allocated last. Channel quality measurements are based on recent usage and recent failures. Good channels that have not been used for a while are assumed not to be as good as good channels that have just been released. Idle RLAs are used to determine the sanity of bad channels. Some of the prior bad channels are automatically re-enabled if they are determined to be good again when tested with idle RLAs.

5. Credit Allocation Protocol. The credit protocol allows single upstream cable channels to be shared by multiple RLAs. This is contrasted to a "normal" "sole user upstream channel" in which is owned and used by by a single RLA until that RLA relinquishes the channel. Any HAS cable upstream channel may may be designated to be a shared or "credit" channel. A credit channel is shared between as many as RLAs designated by a particular configuration parameter. Each RLA in the credit group is passed a credit control packet at which time it may use the credit to send data packets to arbitrary hosts. When tan RLA has a credit, it may send a certain number of packets up to a maxium number controlled by a configuration parameter

(MAX_CREDIT_PACKETS) data packets may. After sending any data packets, the RLA returns the credit control packet to the Hybridware™ server software . If the RLA does not have a data packet to send, it simply returns the credit to HAS without sending any data packets. The RLA sets a field in the credit control packet to the number of packets that was sent. If the protocol process at the server does not receive the credit status from the credit control packet within a certain timeout (CREDIT_TIMEOUT) in milliseconds, for a certain number of times (FAIL_CNT) consecutively, the RLA is assumed to be in error and is put in the "not responding" state. The overall upstream channel performance of a RLA using a credit channel is lower than a RLA on a sole use upstream channel. If any sole use upstream channel becomes available, this channel will be given to that credit RLA that has been waiting the longest for a sole use upstream channel that currently has packets to send. If such a credit RLA is found, that RLA returning the sole use channel will be assigned to the credit group.

Brief Description of the Drawings

Figure 1 shows the the overall components of a HAS network. HTFs/PoPs are interconnected via a backbone network. This backbone network can either be a public (e.g., Internet) or a private network. Information Providers connect to the PoP via dedicated lines or via the backbone network itself. Next, each PoP interconnects multiple cable TV head ends, TV transmitters and/or cell (node) sites via high speed links. Finally, RLAs connect to the high speed RF downstream channels and to the independent upstream channels. Figure 2 shows the major building blocks of the HTF/PoP. Hybrid Downstream Routers (HDRs) drive the downstream high speed RF channels and Hybrid Upstream Routers (HURs) receive the independent upstream channels. Figure 3 shows the overall characteristics of the HAS asymmetric link. Figure 4 shows an example of the ack suppression mechanism and the general configuration for both ack and packet suppression. Figure 5 shows the TCP/IP headers and Figure 6 shows an example of the packet suppression mechanism.

Detailed Description of the Illustrative Embodiments

Each of the HAS related inventions described and claimed here include a significant detailed description of their implementation. The detailed description for the ack suppression invention and the detailed description for the packet suppression invention are detailed below.

<I still need to include the detailed descriptions, for the HAS itself and the Hybrid Protocols. >

Ack Suppression

Consider the transmit queue of packets from A to be resident in system A as depicted in Fig. 4(c). Let us assume that "pkt 1" is currently being sent and that "ack 250" message is currently being appended to the end of the transmit queue. Without the ack suppression scheme all 4 packets will be sent to B even though "ack 250" message carries information which supersedes "ack 100" message. The Ack Suppression system will scan the transmit queue, observe that the "ack 100" message is superfluous and delete it, thus reducing the amount of traffic on the communication link from A to B.

In a general case this may introduce additional acknowledgement latency, but in the case where all messages queued up for transmission are acknowledgements, acknowledgement latency is actually reduced. Consider the following case:

"Ack 15" message is being transmitted and "ack 100" message is awaiting transmission. Let us assume that "ack 210" message is appended to the queue. Ack Suppression system will delete "ack 100" message as superfluous. Any new acknowledgements appended while "ack 15" is being transmitted will result in deletions of unnecessary acknowledgements keeping queue length to 2. Upon transmit completion of "ack 15" the system will start transmitting the next acknowledgement (in our case "ack 210" -- see Fig. 4d). This approach eliminated unnecessary transmission of "ack 100" and reduced acknowledgement latency for "ack 210". Ack suppression method reduces the probability of the queue overflow and potential out-of-memory condition in system A, reduces load on the communication link from A to B and in some circumstances reduces acknowledgement latency for data transfers from B to A. This method is applicable when A and B are end-systems, as depicted above, as well as in the situation when A is an intermediate system (e.g. a router) and the data packets are generated by a system C. In this situation C sends packets to A and A forwards them to B. The Ack Suppression method can run on C, A or both (see Fig. 4e).

The Ack Suppression method, although applicable to other protocols, has been developed in the context of the TCP/IP protocol. In order to understand the method it is necessary to

review the TCP/IP header (see Fig. 5). The first five 32 bit words and the following ip options will be referred to as *ip header*. The five words following ip options together with the words containing tcp options are referred to as *tcp header*. We shall refer to the *non-ack tcp header* as the *tcp header* minus the acknowledgement number field.

See RFC xxx and RFC yyy for the full description of the header field usage and the protocol.

The following program is an illustrative example of a specifc implementation of the ack suppression invention for TCP/IP. This is just an example as there are other potential ways to implement this invention. Consider IP acknowledgement "m1" in the transmit queue. Let "m2" be a new acknowledgement about to be enqueued for transmission. The logic of suppressing acknowledgements can be expressed as follows:

```
If (ip header(m1) = ip header(m2)) then
        if (source port (m1) = source port(m2)) then
                if (destination port(m1) = destination port (m2)) then
                        if (sequence number(m1) = sequence number(m2)) then
                                If (acknowledgement number (m1) >
acknowledgement number(m2)) then
                                        discard(m2)
                                endif
                        endif
                endif
        endif
else
        enqueue(m2)
endif
```

Please refer to Fig. 5 for the names of appropriate TCP/IP header fields. In addition, the following amendment shows the correct ack suppression logic which should be expressed as follows:

```
If (ip header(m1) = ip header(m2)) then
        if non-ack tcp header (m1) = non-ack tcp header(m2) then
                If (acknowledgement number (m1) > acknowledgement
number(m2)) then
                        discard(m2)
                endif
        endif
else
        enqueue(m2)
endif
```

Packet Suppression

Let us assume that in Figure 6 the numbers on the data packets indicate the position of the last data byte of the packet in the data stream and that the acknowledgement numbers indicate that all bytes of the data stream up to and including the byte indicated by the ack

have been correctly received. The numbers on the right indicate the amount of data A is allowed to transmit at any given time. System A awaits for an acknowledgement of a packet for a certain amount of time Δt from the time that the packet was transmitted. Then, if the acknowledgement is not received within Δt, the original packet is retransmitted (see Fig. 6b). At this stage, the Packet Suppression scheme searches the transmit queue and disallows (to enqueue) a packet that carries information which is identical to that in a packet already present in a previously enqueued packet (see Fig.6a). This method is applicable when A and B are end-systems, as depicted above, as well as in the situation when A is an intermediate system (e.g. a router) and the data packets are generated by a system C. In this situation C sends packets to A and A forwards them to B. The Packet Suppression method can run on C, A or both (see Fig. 5).

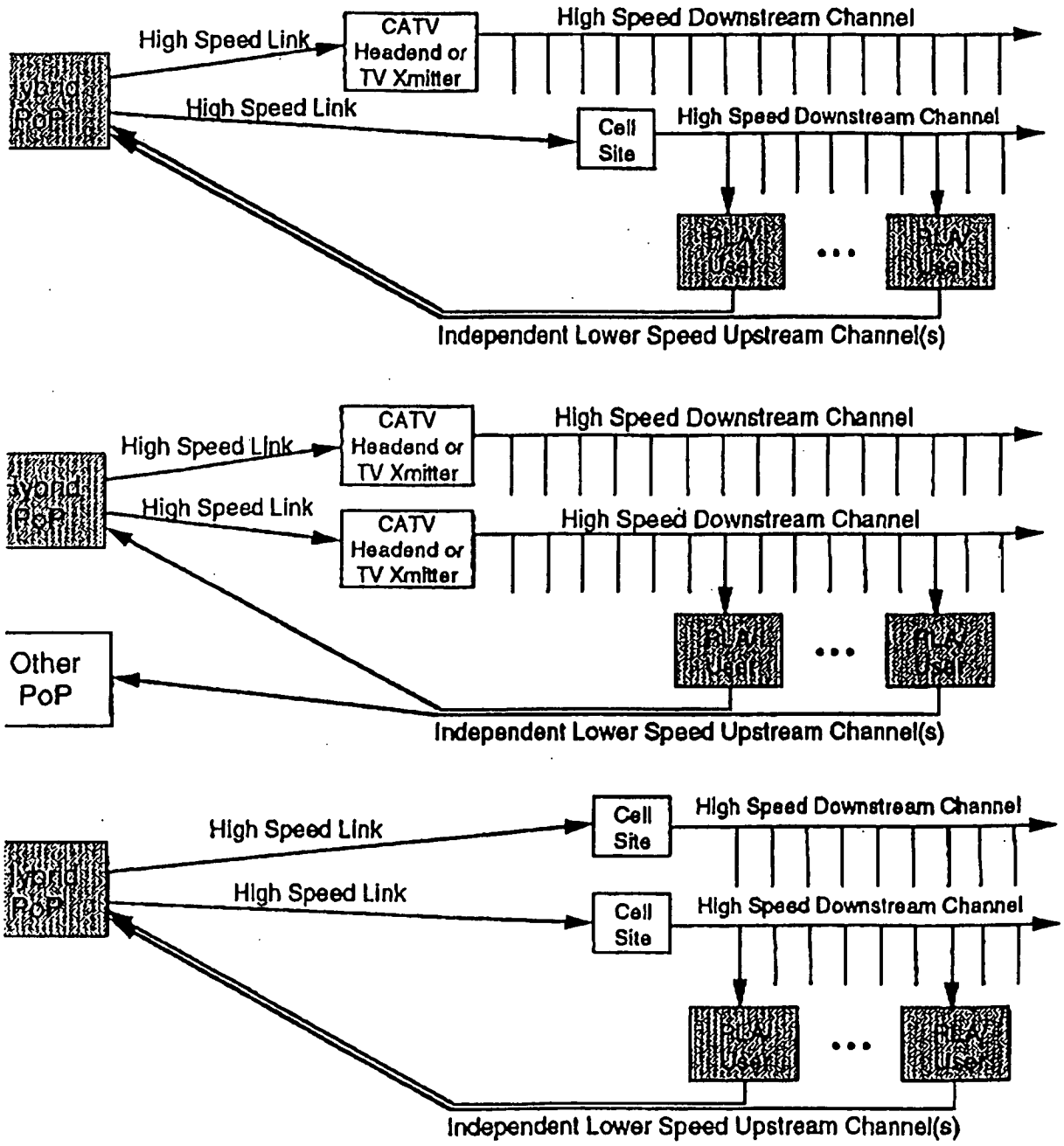
The Packet Suppression method, although applicable to other protocols, has been developed in the context of the TCP/IP protocol. In order to understand the method it is necessary to introduce the TCP/IP header (see Fig. 5). The first five 32 bit words and the following ip options will be referred to as *ip header*. The five words following ip options together with the words containing tcp options are referred to as *tcp header*. We shall refer to the *non-ack tcp header* as the *tcp header* minus the acknowledgement number field.

See RFC xxx and RFC yyy for the full description of the header field usage and the protocol. The following program is an illustrative example of a specifc implementation of the packet suppression invention for TCP/IP. This is just an example as there are other potential ways to implement this invention. Consider IP packet "m1" in the transmit queue. Let "m2" be a new packet about to be enqueued for transmission. The logic of suppressing retransmitted packets can be expressed as follows:

```
If (ip header(m1) = ip header(m2)) then
        if (tcp header (m1) = tcp header(m2)) then
                discard(m2)
                                endif
else
        enqueue(m2)
endif
```

Please refer to Fig. 5 for the names of appropriate TCP/IP header fields.

EXHIBIT H



ess System (HAS) Network -- Figure 1

Hybrid Networks, Inc.

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EXHIBIT H

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1. Introduction

Hybrid Access System HAS) enables communication over a CATV network. The main elements of HAS are: System Manager, Hybrid Router, a Hybrid Client and an application. The application may reside on the same system as the Hybrid Client or it maybe connected to a Hybrid Client via some media (e.g. bus, ethernet, RS232 connection), see Fig. 1. The System Manager may reside on the same system as the Hybrid Router or maybe connected via some media.

When the application requires services of the Hybrid Upstream Protocol to establish connection to a another system, on or outside of HAS. The connection is established via a Hybrid Upstream Protocol (HUP) implementation residing on a Hybrid Router. HUP, a member of the Hybrid protocol family, allows the Hybrid Router to manage upstream bandwidth for data transmissions by the applications and Hybrid clients (see fig. 10). The downstream bandwidth may also be managed on a Hybrid Router using other protocols.

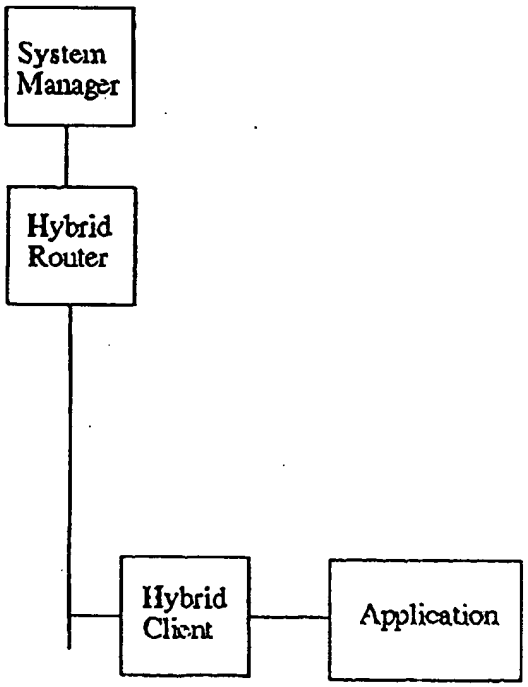


Figure 1

2. Connection flow in a 2-way cable network

An application issues a connection request by sending data it wishes to transmit to the Hybrid Client. Hybrid Client buffers the data and checks if it owns an upstream data channel. If it does the data is transmitted forthwith. If Hybrid Client does not own a data channel it then queues up the data message, creates a Channel Request message and awaits a poll from the Hybrid Router. Upon receipt of the poll, the Hybrid Client transmits the Channel Request message and waits for a response from the Hybrid Router.

Hybrid Router will send a Login message to the System Manager. Based on information contained in its data base the System Manager will send a Login response message which will indicate whether the client is allowed to operate on this network and will contain other operating characteristics of the Hybrid Client.

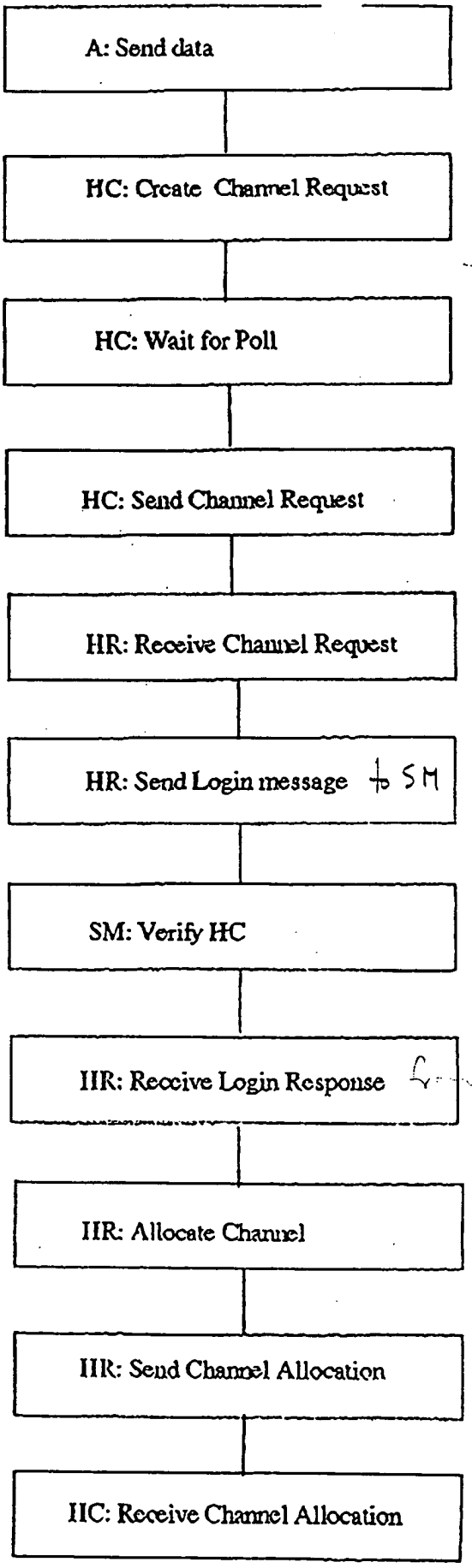
Hybrid Router checks the channel availability and selects the most suitable upstream channel. The suitability maybe influenced by such factors as: channel quality, type of service required, operating characteristics of the Hybrid Client, configuration restrictions or others. Hybrid Router then creates Channel Allocation message which specifies the frequency on which the Hybrid Client is allowed to transmit data.

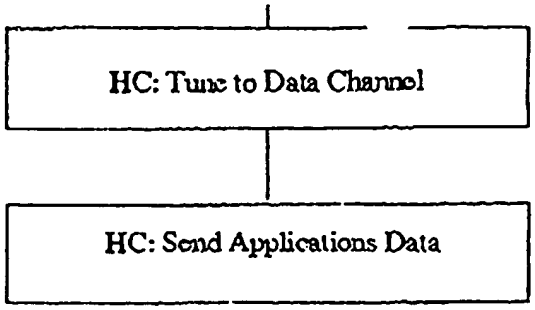
When Hybrid Client receives a Channel Allocation message it then tunes to the specified frequency and begins to transmit the data message which the application wanted to send.

2.1 Connection request flow

Glossary:

A - Application
HC - Hybrid Client
HR - Hybrid Router
SM - System Manager


A: Send data
HC: Create Channel Request
HC: Wait for Poll
HC: Send Channel Request
HR: Receive Channel Request
HR: Send Login message
SM: Verify HC
HR: Receive Login Response
HR: Allocate Channel
HR: Send Channel Allocation
HC: Receive Channel Allocation



3. Connection flow on a 1-way with a phone return cable network

The connection flow is essentially the same as on the 2-way cable network with a few exceptions.

1. Hybrid Client does not have to wait for a poll. Instead it formulates a Channel Request message and dials the Hybrid Router immediately.

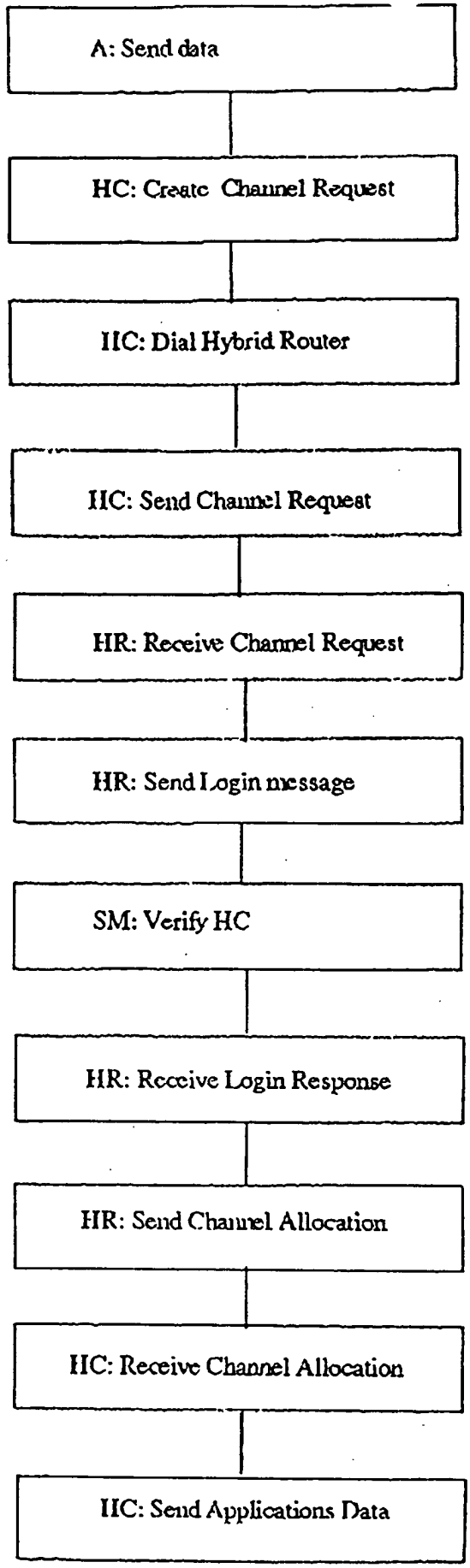
2. Hybrid Router send a Channel Allocation message confirming acceptance of the incoming call, but does not indicate frequency of the data channel as this is not relevant in this case.

3. Hybrid Client starts sending application data over the phone line immediately upon the receipt of the Channel Allocation message.

2.1 Connection request flow

Glossary:

A - Application
HC - Hybrid Client
HR - Hybrid Router\
SM - System Manager


A: Send data
HC: Create Channel Request
HC: Dial Hybrid Router
HC: Send Channel Request
HR: Receive Channel Request
HR: Send Login message
SM: Verify HC
HR: Receive Login Response
HR: Send Channel Allocation
HC: Receive Channel Allocation
HC: Send Applications Data

Packet Suppression Flow diagram

The following diagram depicts the pseudocode in the previous section.

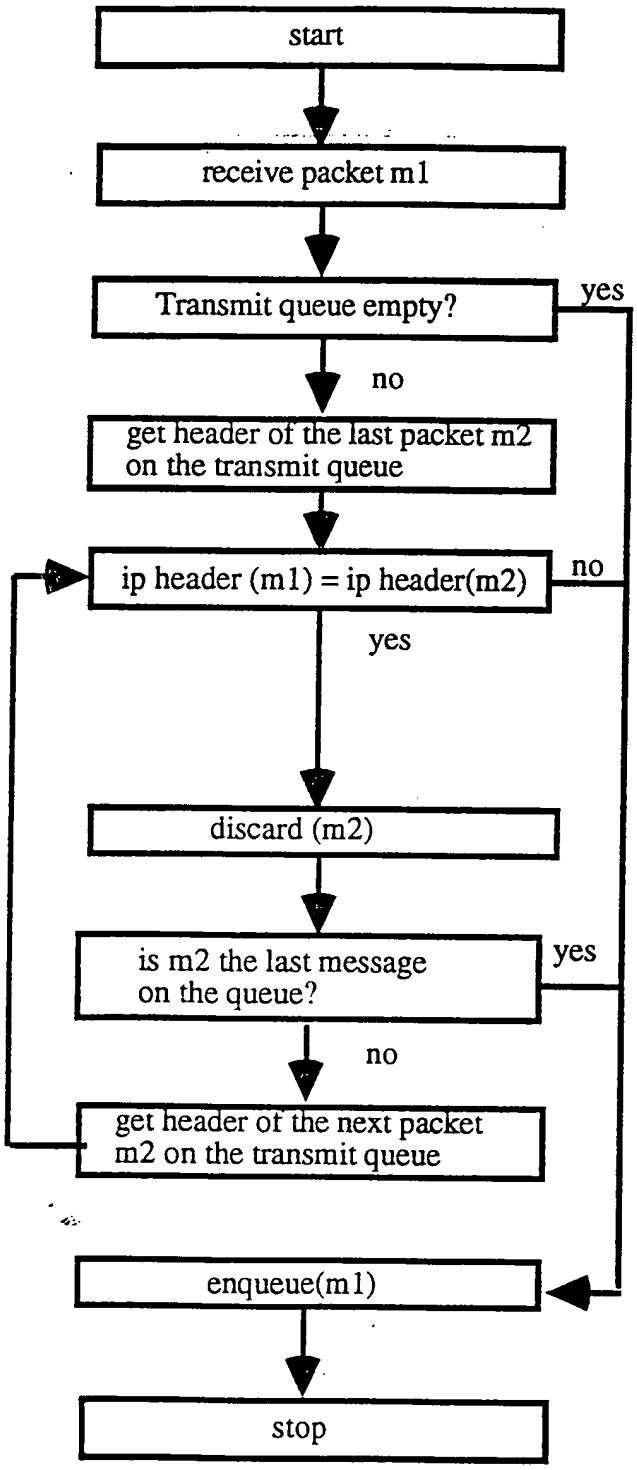


FIGURE 16

Ack Suppression Flow diagram

The following flow diagram depicts the amended pseudocode.

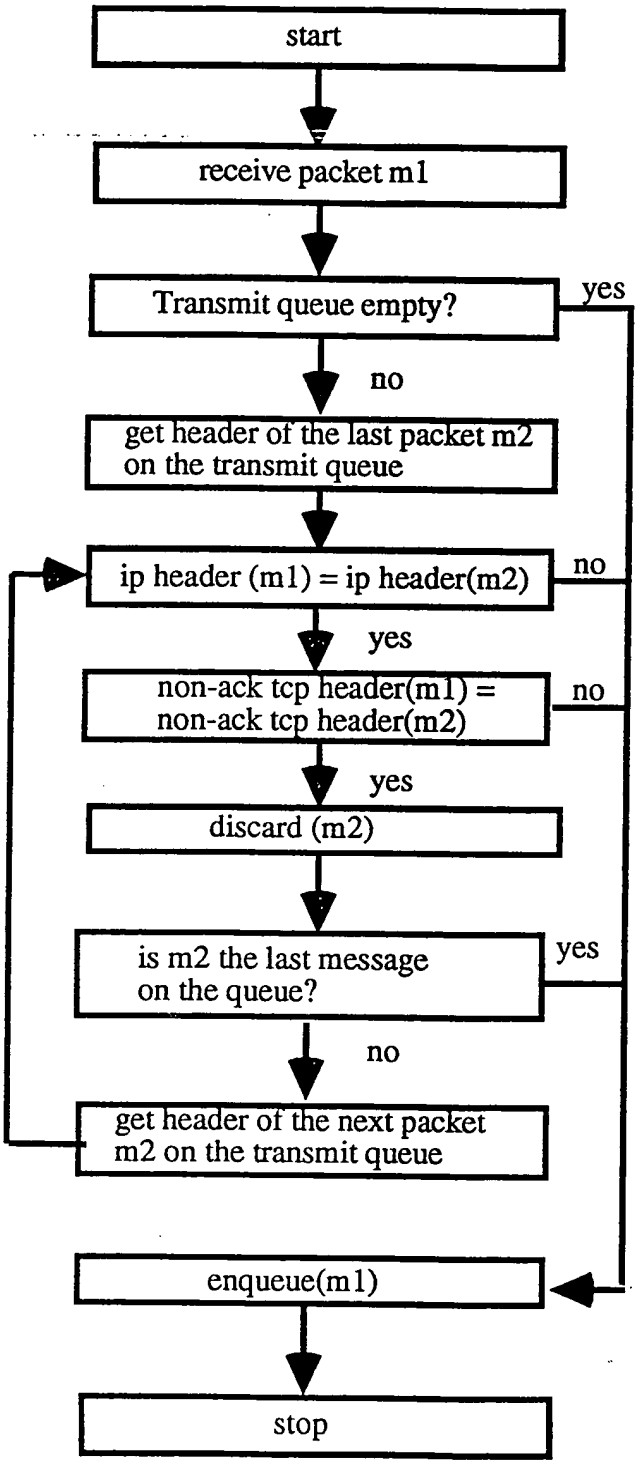


FIGURE 15

new

EXHIBIT I

Hybrid

February 1, 1995

Fenwick & West
Attn: Robert Sabath
Two Palo Alto Square
Palo Alto, CA 94306

Re: Flow Diagrams

Dear Bob,

Ed Moura and Jan Gronski have prepared the attached flow diagrams which describe our Hybrid Access System. We believe that you now have enough information to prepare a draft of claims for this patent application.

Please give Ed a call if you need clarification on the flow diagrams and give me a call if you have any other questions.

Yours truly,

Rick Fuller
Vice President, Finance

Hybrid Networks, Inc. • 10201 Bubb Road • Cupertino, CA 95014-4167 • 408-725-3250 • FAX 408-725-2439

HAG Protocol

1.0 Introduction

Hybrid Adaptive Gain control protocol has been developed to overcome noise and attenuation while transmitting on cable in the upstream direction. HAG is an integral part of Hybrid Upstream Protocol suite and to understand it fully the reader must be familiar with other members of this protocol family.

Hybrid Upstream Protocol uses a form of polling to enable client systems to request a channel or report status. Hybrid router indicates to the client what was the last poll response that it received from the client. This provides the feedback to the client which is necessary for the client to evaluate if its responses are being received by the Hybrid Router.

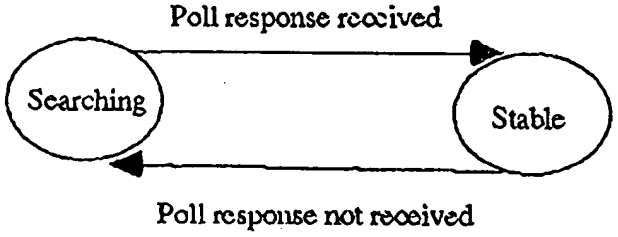
2.0 Description

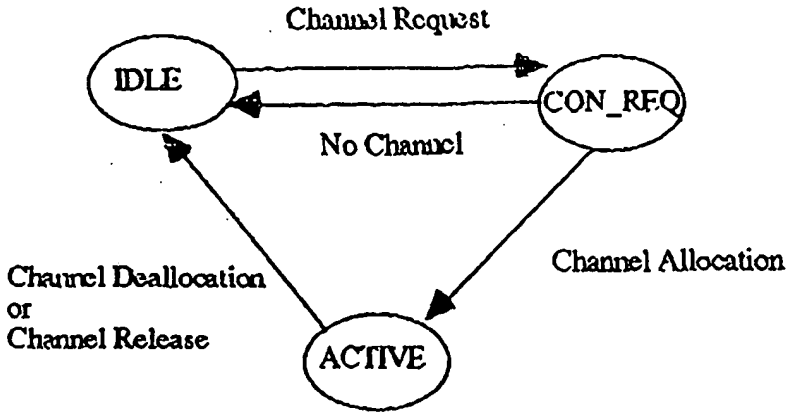
HAG has 2 states: STABLE and SEARCHING.

In the STABLE state HAG evaluates poll messages from the Hybrid Router. If the poll message indicates a loss of a poll response then HAG transitions to the SEARCHING state. Poll responses are transmitted at a fixed power level. Periodically the, at a very slow rate, the client will reduce the power level to assess if it is possible to transmit with less power.

In the SEARCHING state the client system will respond to polls with a poll response transmitted at a larger and larger power level. Poll responses will be transmitted starting with some system defined minimum power level and increasing through a system defined maximum power level. Upon reaching the maximum level the client system will transmit poll responses at a minimum power level. This process will continue until a poll

3.0 State Diagram




Channel Request
IDLE
CON_REQ
No Channel
Channel Deallocation
or
Channel Release
Channel Allocation
ACTIVE

HUP Client States

1. Introduction

Hybrid Upstream Protocol is a member of a protocol family which mediates communication over a cable network.

Let us consider a client system connected to a cable network and an application which runs on the client. In this context Hybrid Upstream Protocol (HUP) provides the application with a means to request and obtain an upstream channel for data transmissions.

The client communicates with a Hybrid Router through poll responses.

2. Description

HUP client system has 3 basic states: IDLE, CON_REQ and ACTIVE.

In IDLE state the client , when polled, will transmit an Idle poll response if there is no request from the application. It will respond with a Channel Request message if there is data that needs to be sent in the upstream direction. Upon transmitting Channel Request message client will transition to the CON_REQ state.

In CON_REQ state the client expects one of two messages from the Hybrid router: Channel Allocation or No Channel Available message. Upon receiving the former the client informs the application, tunes to the channel it was allocated and transitions to ACTIVE state. Upon receiving the latter the client informs the application and transitions to IDLE state.

In ACTIVE state the client forwards data messages from the application to the upstream transmitter.

In ACTIVE state the client monitors the application activity and if it detects that no data has moved from the application to the upstream transmitter for a system defined period of time it will send a Channel Deallocation Request and transition to the IDLE state.

In ACTIVE state the application may explicitly request that the channel be released, in which case the client will send a Channel Deallocation Request to the Hybrid router and will transition to the IDLE state.

Hybrid router may also send an unsolicited Channel Release message, in which case the client will notify the application and transition from ACTIVE to IDLE state.

3. State Diagram

Packet Suppression Flow diagram

The following diagram depicts the pseudocode in the previous section.

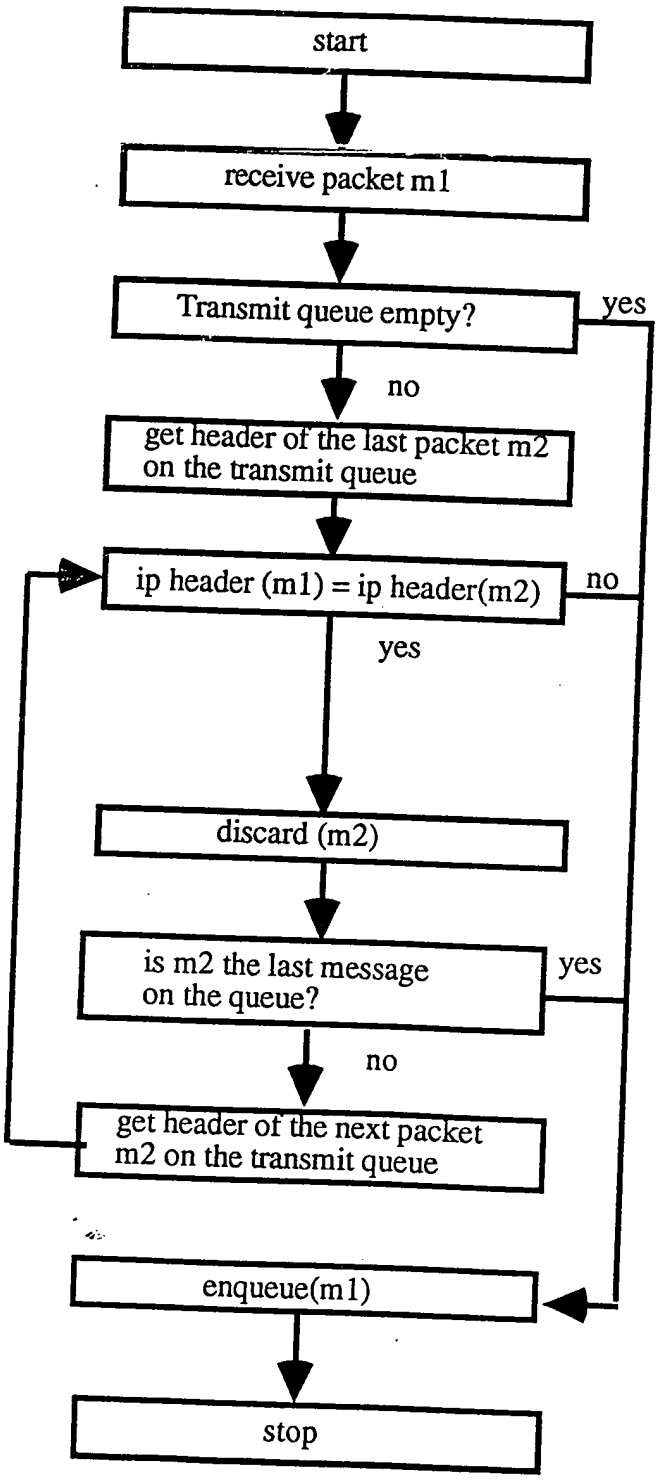


FIGURE 16